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NATIONAL DAM SAFETY PROGRAM. LAKE CHATEAU DAM (MO 10015), MISSO--ETC(U)
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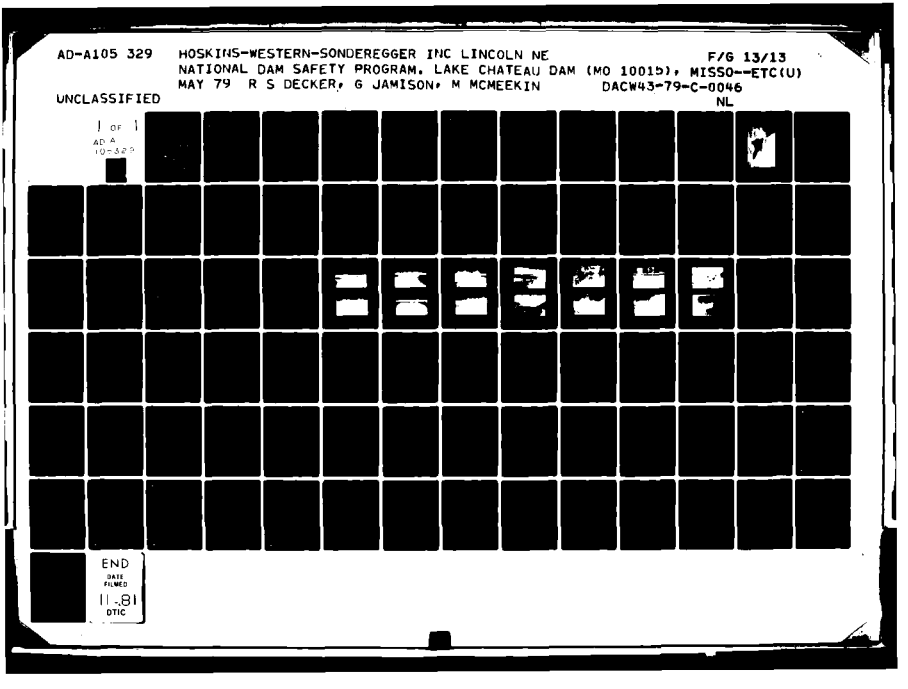

MISSOURI - KANSAS CITY BASIN

LAKE CHATEAU DAM

BOONE COUNTY, MISSOURI

MO. 10015

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

United States Army
Corps of Engineers
...Serving the Army
...Serving the Nation

St. Louis District

PREPARED BY: U.S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

MAY, 1979

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety, Lake, Dam Inspection, Private Dams

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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☆ U.S. G.P.O. 1980-665-141/1299

LAKE CHATEAU DAM
BOONE COUNTY, MISSOURI
MISSOURI IDENTIFICATION NO. 10015

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

PREPARED BY
HOSKINS-WESTERN-SONDEREGGER, INC.
CONSULTING ENGINEERS
LINCOLN, NEBRASKA

UNDER DIRECTION OF

ST. LOUIS DISTRICT, CORPS OF ENGINEERS

FOR

GOVERNOR OF MISSOURI

MAY, 1979

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 TUCKER BOULEVARD, NORTH
ST. LOUIS, MISSOURI 63101

REPLY TO ATTENTION OF

LMSED-FI

SUBJECT: Lake Chateau Dam Phase I Inspection Report

This report presents the results of field inspection and evaluation of the Lake Chateau Dam (Mo. 10015).

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, emergency by the St. Louis District as a result of the application of the following criteria:

a. Spillway will not pass a 10-year frequency flood without overtopping of the dam. The spillway is, therefore, considered to be unusually small and seriously inadequate.

b. Overtopping could result in dam failure.

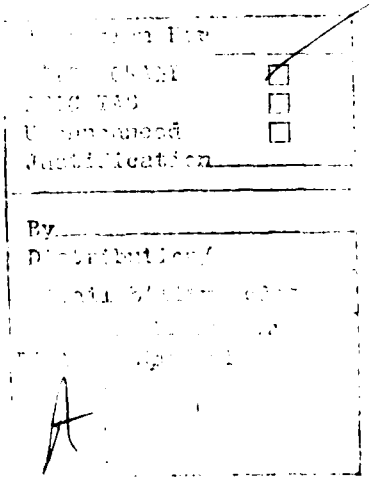
c. Dam failure significantly increases the hazard to life and property downstream.

SIGNED

Submitted By: _____ 12 MAY 1980
Chief, Engineering Division — Date

SIGNED

Approved By: _____ 13 MAY 1980
Colonel, CE, District Engineer — Date



PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
ASSESSMENT SUMMARY

Name of Dam	Lake Chateau Dam
State Located	Missouri
County Located	Boone County
Stream	Tributary Little Cedar Creek
Date of Inspection	May 31, 1979

Lake Chateau Dam was inspected by an interdisciplinary team of engineers ~~from Hoskins-Western-Sonderegger, Inc.~~ The purpose of the inspection was to make an assessment of the general conditions of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations, and private engineers. Based on these guidelines, this dam is classified as a small size dam with a high downstream hazard potential. Failure would threaten life and property. The estimated damage zone extends approximately 1/2 mile downstream of the dam. Within the damage zone are two dwellings and Highway WW.

Our inspection and evaluation indicates that the spillways do not meet the criteria set forth in the recommended guidelines for a small dam having a high hazard potential. Considering the volume of water impounded and the large downstream floodplain, one-half of the Probable Maximum Flood is the appropriate spillway design flood. The spillways for this dam will not pass the 100-year flood (flood having a one percent chance of being exceeded in any year) nor will it pass the 10-year flood without overtopping the levee extension of the dam. The spillways have the capacity to pass five percent of the Probable Maximum Flood without overtopping the levee extension. The Probable Maximum Flood (PMF) is defined as the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

This dam is severely deficient in spillway capacity. Recommendations presented in Paragraph 7.2a of this report are as follows:

1) The height of the levee extension should be increased to equal the height of the main dam. The size of the emergency spillway should be increased and/or the emergency spillway should be lowered in order to pass one-half of the Probable Maximum Flood.

2) Measures should be taken to control the erosion of the existing channel that is cut through the left abutment of the main dam.

3) Seepage and stability analyses comparable to the "Recommended Guidelines for Safety Inspection of Dams" should be obtained.

These recommendations should be pursued immediately.

Other deficiencies observed during the inspection are trees and shrubs growing on both slopes, seepage along the toe and erosion of the upstream slope. Recommendations covering these items are presented in Paragraph 7.2b.

Rey S. Decker
E-3703

Gordon Jamison

Michael McMeekin
E-4776

H. P. Hoskins
Harold P. Hoskins
Chairman of Board
Hoskins-Western-Sonderegger, Inc.
E-8696

PHOTO NO. 1 - OVERVIEW

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
LAKE CHATEAU DAM - MO 10015
BOONE COUNTY, MISSOURI

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer directed that a safety inspection of Lake Chateau Dam be made.

b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams," Appendix D to "Report of the Chief of Engineers on the National Program of Inspection of Dams," dated May, 1975, and published by the Department of the Army, Office of the Chief of Engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances.

(1) The main dam is an earth fill about 30.5 feet in height and 800 feet long. A levee about 3 to 4 feet in height and approximately 250 feet in length extends westward from the north (left) end of the dam. The levee diverts drainage from approximately 27 acres to the north of the dam (see plate A-1) through an eroded channel cut through the left abutment of the main dam. A very small pond is located on the north side of the levee. Overflow from this pond flows along the north side of the levee through the eroded channel in the left abutment of the main dam. Three sewage lagoons are located downstream from the dam. Two of the lagoons are immediately downstream of the toe of the dam on the

left end. The third lies to the north and is located high on the left abutment. The continuation of the channel referred to above is located between the higher lagoon and the northernmost lagoon at the toe of the dam.

The dam and levee extension are constructed in gently rolling topography. Soils in the area are probably Keswick and Findley developed on thin loess and fine grained glacial till overlying limestone.

(2) The principal spillway consists of a 6 foot diameter steel pipe riser with a 30 inch diameter welded steel pipe conduit passing through the embankment.

(3) A vegetated earth emergency spillway is cut through the right abutment.

(4) Pertinent physical data are given in paragraph 1.3 below.

b. Location. The dam is located in the east central portion of Boone County, Missouri, as shown on Plate A-2. The dam is shown on Plate A-1 in the NE¼ of Section 29, T48N, R11W. The lake formed behind the dam is shown in the NE¼ of Section 29, T48N, R11W.

c. Size Classification. Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1c above. Based on these criteria, this dam and impoundment is in the small size category.

d. Hazard Classification. Guidelines for determining hazard classification are presented in the same guidelines as referenced in paragraph 1.1c above. Based on referenced guidelines, this dam is in the high hazard classification. The estimated damage zone extends for about one-half mile downstream. The channel from the dam enters the larger Little Cedar Creek about one-fourth mile downstream from the dam. Improved Highway WW crosses Little Cedar Creek about 600 feet upstream from the subject confluence. Two dwellings occupy the high flood plain of Little Cedar Creek about 0.5 miles downstream from the dam.

e. Ownership. The dam is owned by Lake Chateau, Inc., c/o William Castle, Route 2, Columbia, Missouri 65201.

f. Purpose of Dam. The dam impounds a recreational lake covering about 25 acres with normal storage of 183± acre feet.

g. Design and Construction History. Some very preliminary design assistance was provided by the Soil Conservation Service (SCS) for this dam. The dam was constructed in 1964. It was reported by the SCS that about 1966 some of the welds failed on the pipe spillway, and a portion of the downstream slope was eroded out. The pipe was uncovered and repaired and the damaged downstream slope was rebuilt.

h. Normal Operating Procedure. There are no controlled outlets for this dam. The reservoir level is governed by rainfall, infiltration, evaporation and the capacity of the uncontrolled spillways.

1.3 PERTINENT DATA

a. Drainage Area. 1.26 sq. mi. (808 acres).

b. Discharge At Damsite.

(1) All discharges at the damsite are through the principal spillway pipe or the vegetated earth emergency spillway or over the levee on the left side of the embankment. Discharge over the levee will exceed the discharge through the emergency spillway.

(2) Estimated maximum flood - Unknown.

(3) The principal spillway capacity varies from 0 c.f.s. at elevation 802.2 (riser crest) to 122 c.f.s. at elevation 804.3 (minimum crest elevation of levee) to 127 c.f.s. at elevation 806.5 (minimum crest elevation of main dam).

(4) The emergency spillway capacity varies from 0 c.f.s. at its crest elevation of 805.0 to 320 c.f.s. at elevation 806.5 (minimum crest elevation of dam).

(5) Discharge over the levee varies from 0 c.f.s. at the minimum crest elevation of 804.3 to 140 c.f.s. at elevation 805.0 (emergency spillway crest) to 2290 c.f.s. at elevation 806.5 (minimum crest elevation of main dam).

(6) Total discharge at the minimum crest elevation of the main dam including discharges over the levee at the left end is 2740 c.f.s.

c. Elevations (Feet above M.S.L.)

(1) Top of dam - 806.5± (minimum-main dam) 804.3± (minimum-levee)
(2) Principal spillway crest - 802±
(3) Emergency spillway crest - 805±
(4) Streambed at center line - 776±
(5) Maximum tail water - Unknown

d. Reservoir. Length (feet) of maximum pool - 2,400±

e. Storage (Acre-feet).

(1) Top of dam - 330±
(2) Principal spillway crest - 183±

f. Reservoir Surface (Acres).

(1) Top of dam - 33±
(2) Principal spillway crest - 25±

g. Dam.

(1) Type - earth fill
(2) Length - 800 feet± (main dam) with 250 feet± levee on left end.
(3) Height - Minimum = 30.5 feet±, maximum 32 feet±
(4) Top width - 12 feet ±
(5) Side slopes.

(a) Downstream - 2.5H on 1V (measured)
(b) Upstream - 3.8H on 1V (measured, exposed)

(6) Zoning- unknown
(7) Impervious core - unknown
(8) Cutoff - unknown
(9) Grout curtain - unknown
(10) Wave protection - none

h. Diversion Channel and Regulating Tunnel. None

i. Spillway

(1) Principal

(a) Type - Uncontrolled drop inlet with 6 foot diameter steel riser and 30 inch diameter steel pipe conduit.

(b) Crest (invert) elevation - 802.2 feet±
Outlet - (invert) elevation - 777.5 feet±

(c) Length - 90 feet±

(2) Emergency

(a) Type - well vegetated earth, uncontrolled spillway located on right end of dam, 80 foot± bottom width.

(b) Control section - 80 feet± wide, 50 feet± long.

(c) Crest elevation - 805 feet±

(d) Upstream Channel - vegetated, about 50 feet in length on very flat slope.

(e) Downstream Channel - vegetated and open on 3% to 16.5% slope.

j. Regulating Outlets. None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design data was available for this dam.

2.2 CONSTRUCTION

No construction data were available. It was reported by S.C.S. personnel that the dam was built in 1964.

2.3 OPERATION

No data were available on spillway operation.

2.4 EVALUATION

a. Availability. No data were available.

b. Adequacy. The field surveys and visual observation presented herein are considered adequate to support the conclusion of this report. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.

c. Validity. Not applicable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. A visual inspection of the Lake Chateau Dam was made on May 31, 1979. Engineers from Hoskins-Western-Sonderegger, Inc., Lincoln, Nebraska, making the inspection were: Rey S. Decker, Geotechnical; Gordon Jamison, Hydrology; and Michael McMeekin, Civil Engineer. The owner was contacted by telephone but was not present during the inspection.

b. Dam.

(1) Geology and Soils (abutment and embankment). The abutments consist of glacial till over limestone. What appeared to be thick bedded, massive limestone (probably Jefferson City) is exposed in the right abutment spillway cut but was not observed in the left abutment. Valley alluvium consists of CL-ML soils underlain by gravelly materials. Borings on the embankment crest indicate about 2 feet of CL-ML soil high in silt with good CL-CH soils below that depth. Soils on the downstream slope are CL-CH.

(2) Upstream Slope. The upstream slope is well vegetated from the crest down to about half way to the lake level. At this elevation (804 feet or 805 feet) wave wash has eroded the face to an almost vertical slope. A number of cottonwoods and willows ranging up to 3-inch diameter are growing on the face. No rodent holes or abnormal deformations were noted on the upstream slope.

(3) Crest. The crest is very well vegetated with adapted grasses. No slides, rodent holes, cracks or abnormal deformations were noted along the crest. The profile of the crest of the main dam is quite uneven, with as much as 1.4 feet variance in elevation between ℄ station 2+00 and 4+50. The crest line of the levee or diversion on the left end of the dam is fairly uniform but is about 2.2 feet lower in elevation than the main dam and about 0.7 feet lower than the crest of the emergency spillway. No evidence of overtopping was noted.

(4) Downstream Slope. The downstream slope is heavily vegetated with grass and many shrubs and trees ranging up to 6-inches in diameter. Two sewage lagoons are located along the left end of the dam about 20 feet

downstream from the toe of the dam. Seepage outcrops along the toe in the left abutment trough from about station 0+30 to 2+30. Most of the seepy area extends up the downstream slope to an elevation 2 or 3 feet above the toe. The seep area is confined to the area left of the principal spillway outlet between the toe of the dam and the sewage lagoon which undoubtedly influences the subsurface drainage characteristics of this area. Discharge from the seep area was moving so slowly that it was not possible to estimate the quantity of flow. Borings at the toe of the dam to the right of the pipe spillway outlet show groundwater at depths of 2.5 to 3 feet below the surface. No slides or deformation were noted on the downstream slope.

(5) Miscellaneous. The main dam and the levee extension are well vegetated. The levee extension could probably withstand the overtopping to be expected from the ten year flood if it were not for the eroded condition of the channel that carries the water through the left abutment of the main dam. Prolonged flows through this channel could accelerate the headcutting of the channel and could result in breaching of the reservoir prior to overtopping of the main dam.

c. Appurtenant Structures

(1) Principal Spillway. The principal spillway appears to be in good condition. The lake level was slightly below the crest of the riser when inspected.

(2) Emergency Spillway. The emergency spillway is well vegetated with grass. A few small trees are growing in the entrance. The upstream face of the entrance has eroded to nearly vertical from normal pool elevation up about 3.5 feet. There was no evidence that the spillway has operated. Limestone is exposed or covered with a few inches of topsoil in the outlet channel and part of the control section of the spillway. The small gulley (1 to 2 feet deep by 1 foot wide) eroded in the left side of the exit channel appears to be the result of abutment runoff. Spillway discharges will probably encroach on the downstream toe of the dam, as discussed in section 5 of this report. The extension of the dam on the left end is approximately the same elevation as the emergency spillway.

(3) Drawdown facilities. There were no drawdown facilities observed at this dam.

d. Reservoir Area. No significant wave wash was observed around the shoreline. No slump or slides were observed.

e. Downstream Channel. The scour hole for the pipe spillway is well armored with cherty gravel and limestone cobble and appears to be stable. The creek channel below the scour hole is overgrown with trees and brush. The outlet channel for the side drainage around the left end of the dam is quite badly eroded.

3.2 EVALUATION

The dam appears to be in good shape except for lack of maintenance in controlling tree growth. The embankment slopes should provide adequate safety against shear failure for a dam of this height. Seepage along the left end of the downstream slope does not appear to be critical. Overtopping of the main dam should not cause serious damage. However, it would appear that overtopping of the left extension (levee) of the dam would occur before emergency spillway discharge. Such overtopping could accelerate the gully erosion in the left abutment trough and could lead to ultimate breaching of the reservoir.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no controlled outlet works for this dam. The pool level is controlled by rainfall, evaporation and the capacity of the uncontrolled spillways.

4.2 MAINTENANCE OF DAM

Maintenance has been lax in not controlling tree growth on the dam and erosion in the left abutment trough.

4.3 MAINTENANCE OF OPERATING FACILITIES

No operating facilities exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

There is no warning system in effect for this dam.

4.5 EVALUATION

There does not appear to be any serious potential of failure of this structure.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. No design data were available for Lake Chateau Dam.

b. Experience. There are no available records of reservoir operation or frequency of emergency spillway operation.

c. Visual Observations.

(1) The principal spillway,consisting of a 30 inch diameter steel pipe with a 6 foot diameter steel pipe riser, is in good condition.

(2) The earth emergency spillway on the right abutment of the dam is well-vegetated. The upstream face of the spillway entrance channel is eroded to a vertical slope for approximately 3.5 feet above the reservoir normal pool. A gully is eroded in the left side of the spillway exit channel. Discharges from the emergency spillway will flow along the downstream toe of the dam.

(3) Elevations of the east-west levee at the left end of the dam, which diverts local drainage from the north around the main dam, are approximately 2.2 feet lower than the main dam elevations and approximately 0.7 feet lower than the emergency spillway crest. Flood flows, therefore, will overtop this levee prior to the occurrence of emergency spillway flow and prior to overtopping the main dam. Flows overtopping the levee will discharge into an eroded channel which is cut through the left abutment of the main dam.

d. Overtopping Potential. According to the guidelines of the Department of the Army, Office of the Chief of Engineers, Lake Chateau Dam is classified as having a high hazard rating and a small size. One half of the Probable Maximum Flood (PMF) to the PMF, therefore, is the recommended design flood for evaluation of the adequacy of the dam and its spillways.

The existing spillways will not pass the 10-year flood, the 100-year flood or one-half of the Probable Maximum Flood without overtopping the levee extension of the dam. Prolonged flows in the channel cut through the left abutment from overtopping of the levee could accelerate the headcutting of the channel and could result in breaching of the reservoir.

Flood	Peak Inflow Discharge c.f.s.	Peak Outflow Discharge c.f.s.	Maximum Pool Elevation	Freeboard * Top of Dam Min. Elev. 804.3	Duration of Dam Overtopping Hrs.
10 yr.	1600	800	805.5	-1.2'	7+
100 yr.	2700	2100	806.2	-1.9'	9+
0.50 PMF	5000	4700	807.1	-2.8'	15+
PMF	9900	9800	808.1	-3.8'	16+
0.05 PMF	500	100	804.3	0.0	0

*Minimum top of dam elevation shown is for the levee extension of the dam. Minimum top of dam elevation for the main dam is 806.5.

The drainage area of the Lake Chateau Dam watershed was determined from the U.S.G.S. Millersburg, Missouri, 7½-minute topographic quadrangle map. Reservoir surface area and elevation-storage data were also determined from this map. Computations for spillway and dam overtopping discharge ratings were based on surveys made during the field inspection. Hydraulic and hydrologic computations are described in Appendix D.

The estimated downstream damage zone is described in paragraph 1.2d of this report.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation. This dam appears to be structurally stable. The side slopes and apparent materials in the dam would provide adequate safety against shear failures. The effects of seepage forces on stability are not known. The heavy tree growth on the downstream slope could ultimately affect the structural integrity of the dam.

b. Design and Construction Data. No design or construction data were available. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency.

c. Operating Records. There are no controlled operating facilities for this dam.

d. Post Construction Changes. It was reported by S.C.S. personnel that some of the welds in the pipe spillway conduit failed about 2 years after construction and that part of the downstream section was damaged by erosion. The pipe was excavated and repaired and the affected section of the downstream slope was rebuilt.

e. Seismic Stability. This dam is located in Seismic Zone 1. An earthquake of the magnitude predicted in this area is not expected to cause structural failure of this dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. Overtopping of the levee extension of this dam for prolonged periods could cause breaching of the reservoir. Analyses presented in Section 5 indicate that the levee would be overtopped by 2.8 feet for a period of more than 15 hours by one-half the probable maximum flood. The effects of seepage through the left end of the dam are not known. Additional studies would be required to determine the effects of full load seepage pressures on the structural stability and of overtopping on the structural and erosional stability of the dam. Tree growth on the downstream slope could result in potential of failure of this dam. Seepage and stability analyses comparable to the requirements of the guidelines were not available which is considered a deficiency.

b. Adequacy of Information. Due to the lack of engineering data, the conclusions in this report are based upon performance history and visual observations. Seepage and stability analyses comparable to the requirements of the guidelines were not available which is considered a deficiency.

c. Urgency. The items recommended in paragraph 7.2.a should be pursued immediately.

d. Necessity for Phase II. Phase II investigation is not considered necessary.

e. Seismic Stability. This dam is located in Seismic Zone 1. An earthquake of this magnitude is not expected to be hazardous to this dam.

7.2 REMEDIAL MEASURES

a. Alternatives.

(1) The height of the levee extension should be increased to equal the height of the main dam. The size of the emergency spillway should be increased and/or the emergency spillway should be lowered in order to pass 50 percent of the Probable Maximum Flood.

(2) Measures should be taken to control the erosion of the existing channel that is cut through the left abutment of the main dam.

(3) Seepage and stability analyses comparable to the "Recommended Guidelines for Safety Inspection of Dams" should be obtained.

(4) The services of an engineer experienced in the design and construction of dams should be obtained to evaluate the existing dam and spillway, make the necessary analyses and to design the required protective measures.

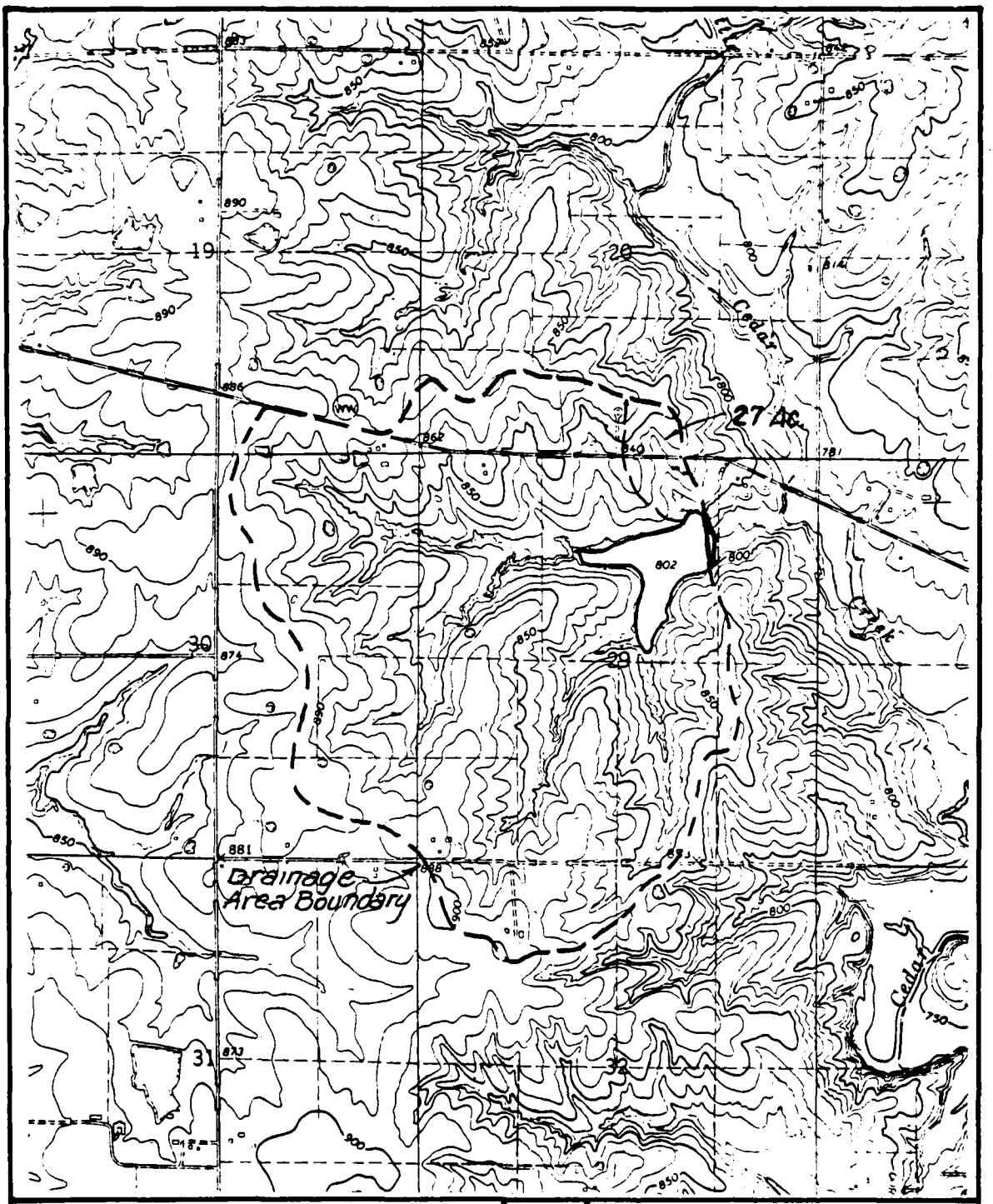
b. O & M Procedures.

(1) Trees and shrubs growing on both embankment slopes should be removed and measures taken to prevent their recurrence. Removal and after-treatment of trees larger than 3 to 4 inches in diameter should be done under supervision of an engineer experienced in design and construction of earth dams.

(2) Measures should be taken to repair and control the erosion on the upstream face of the dam.

(3) A program of regular inspection and maintenance should be initiated to prevent and/or control the deficiencies discussed above. This program should include monitoring the seepage along the downstream toe to determine changes in amount and clarity of the effluent.

APPENDIX A
MAPS



Scale in feet

2000 1000 0 2000 4000

Contour Interval-10'

N

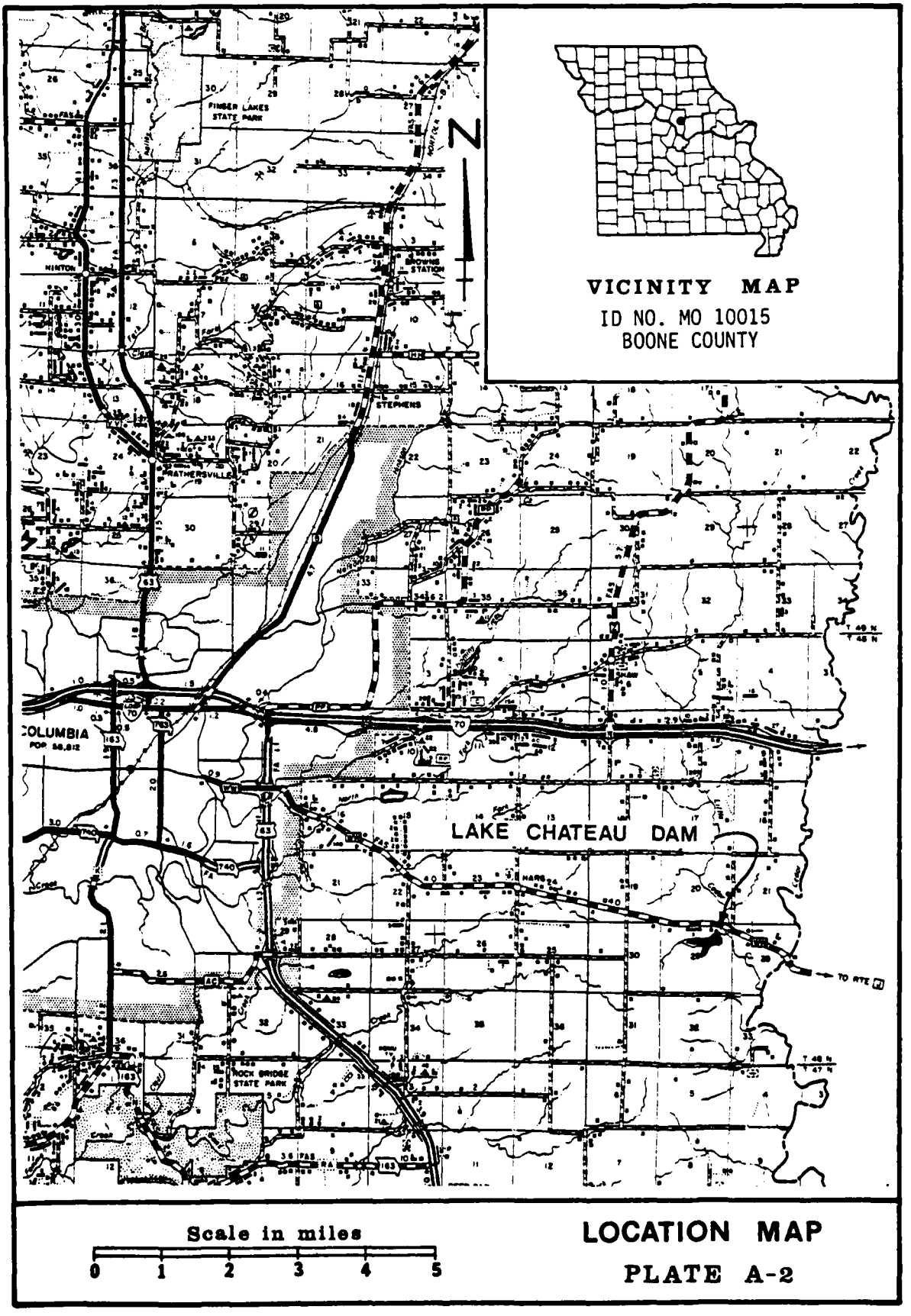
VICINITY TOPOGRAPHY

LAKE CHATEAU DAM

BOONE COUNTY, MISSOURI

MO. 10015

PLATE A-1


VICINITY MAP
ID NO. MO 10015
BOONE COUNTY
N
LAKE CHATEAU DAM
COLUMBIA
FINGER LAKES STATE PARK
STEPHENS
ROCK BRIDGE STATE PARK
TO RTE 63
Scale in miles
0 1 2 3 4 5
LOCATION MAP
PLATE A-2

APPENDIX B
PHOTOGRAPHS

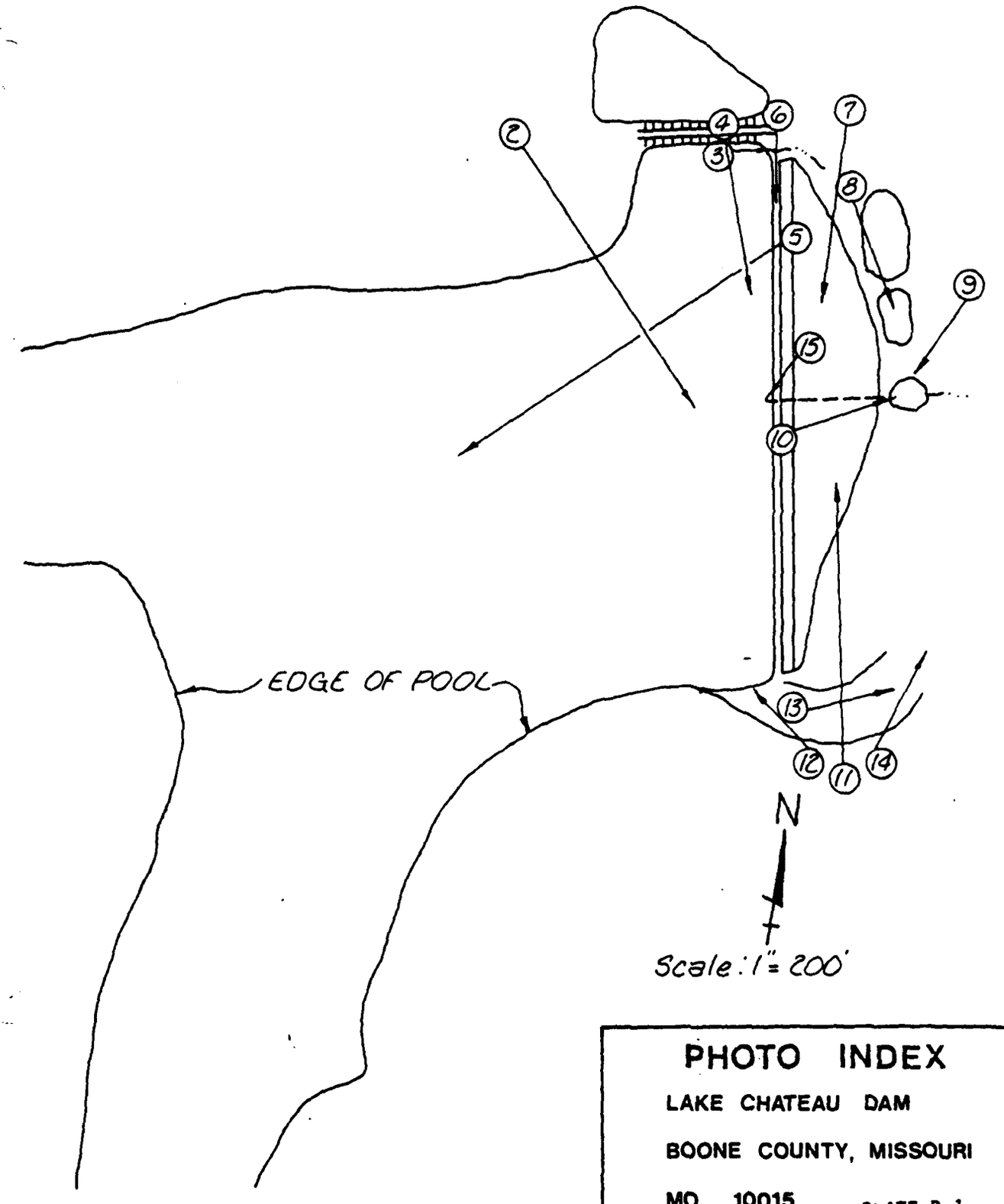


PHOTO INDEX

LAKE CHATEAU DAM

BOONE COUNTY, MISSOURI

MO. 10015 PLATE B-1

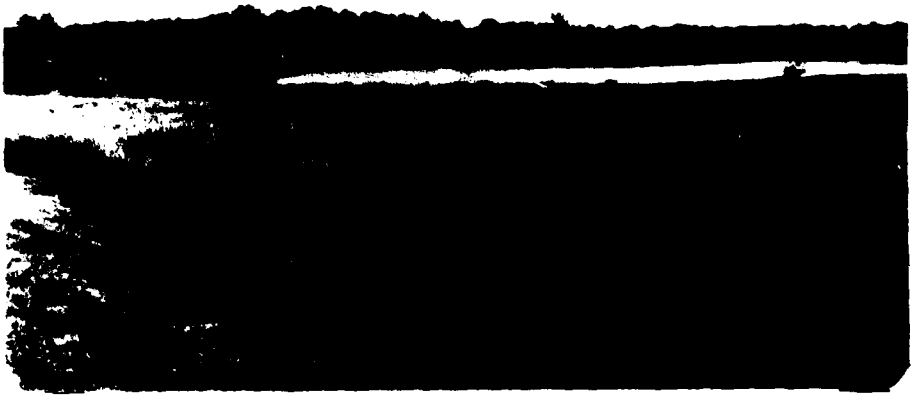


PHOTO NO. 2 - OVERVIEW TAKEN FROM UPSTREAM ON LEFT SIDE

PHOTO NO. 3 - LOOKING DOWNSTREAM IN GULLY LOCATED AT LEFT END OF DAM

PHOTO NO. 4 - UPSTREAM SLOPE FROM LEFT END. NOTE VERTICAL FACE AND TREE GROWTH.

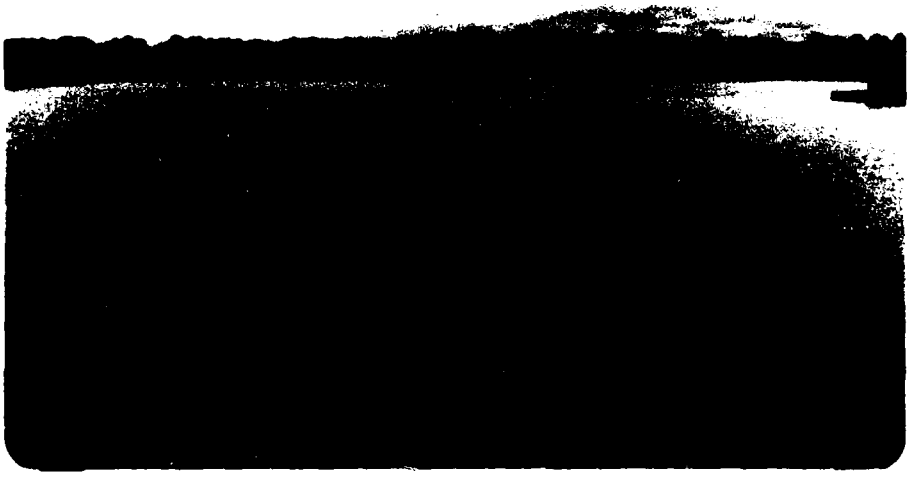


PHOTO NO. 5 - UPSTREAM FROM LEFT END

PHOTO NO. 6 - CREST TAKEN FROM LEFT END

PHOTO NO. 7 - DOWNSTREAM SLOPE FROM LEFT END. AUGER LOCATED NEAR YELLOW BLOOM AT EXTREME RIGHT IS SET IN SEEP OUTCROP. NOTE TREE GROWTH.

PHOTO NO. 8 - SEWAGE LAGOONS DOWNSTREAM ON LEFT.

PHOTO NO. 9 - PRINCIPAL SPILLWAY OUTLET AND STILLING BASIN.

PHOTO NO. 10 - LOOKING DOWNSTREAM INTO STILLING BASIN AND OUTLET CHANNEL.

PHOTO NO. 11 - DOWNSTREAM SLOPE TAKEN FROM RIGHT. NOTE TREE GROWTH.

PHOTO NO. 12 - LOOKING UPSTREAM IN EMERGENCY SPILLWAY. TREES GROWING IN ENTRANCE.

PHOTO NO. 13 - LOOKING DOWNSTREAM IN EMERGENCY SPILLWAY.

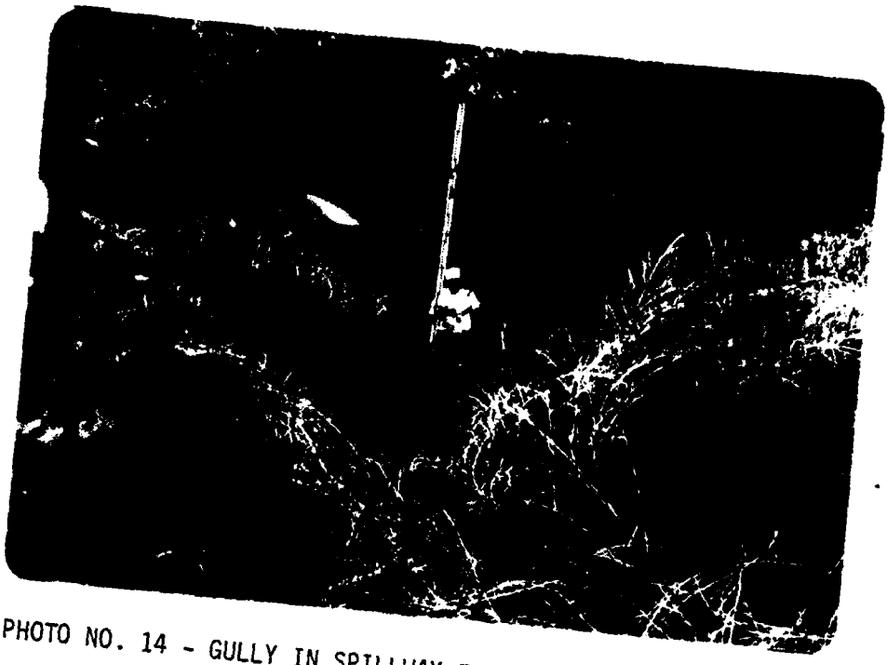


PHOTO NO. 14 - GULLY IN SPILLWAY EXIT CHANNEL

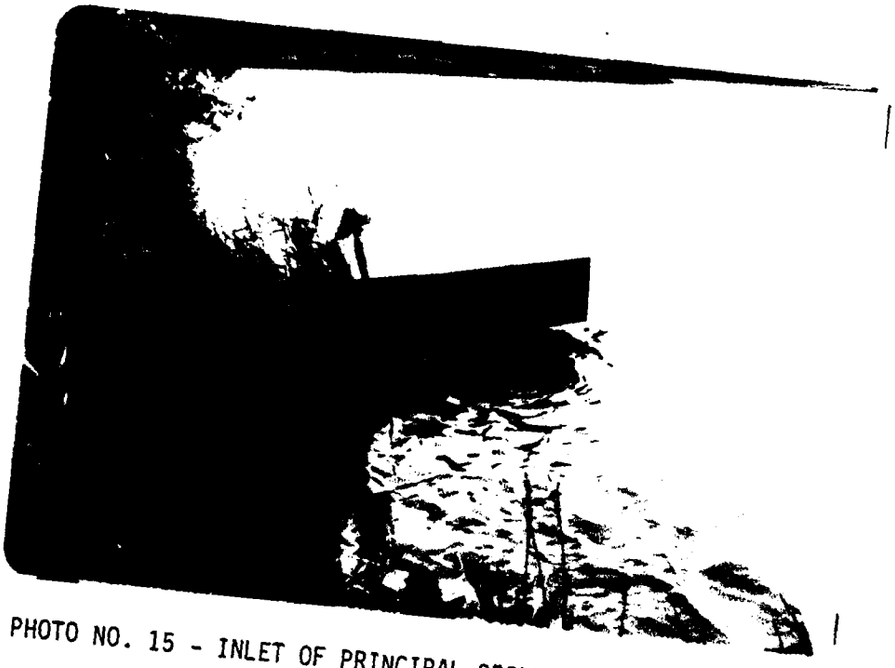
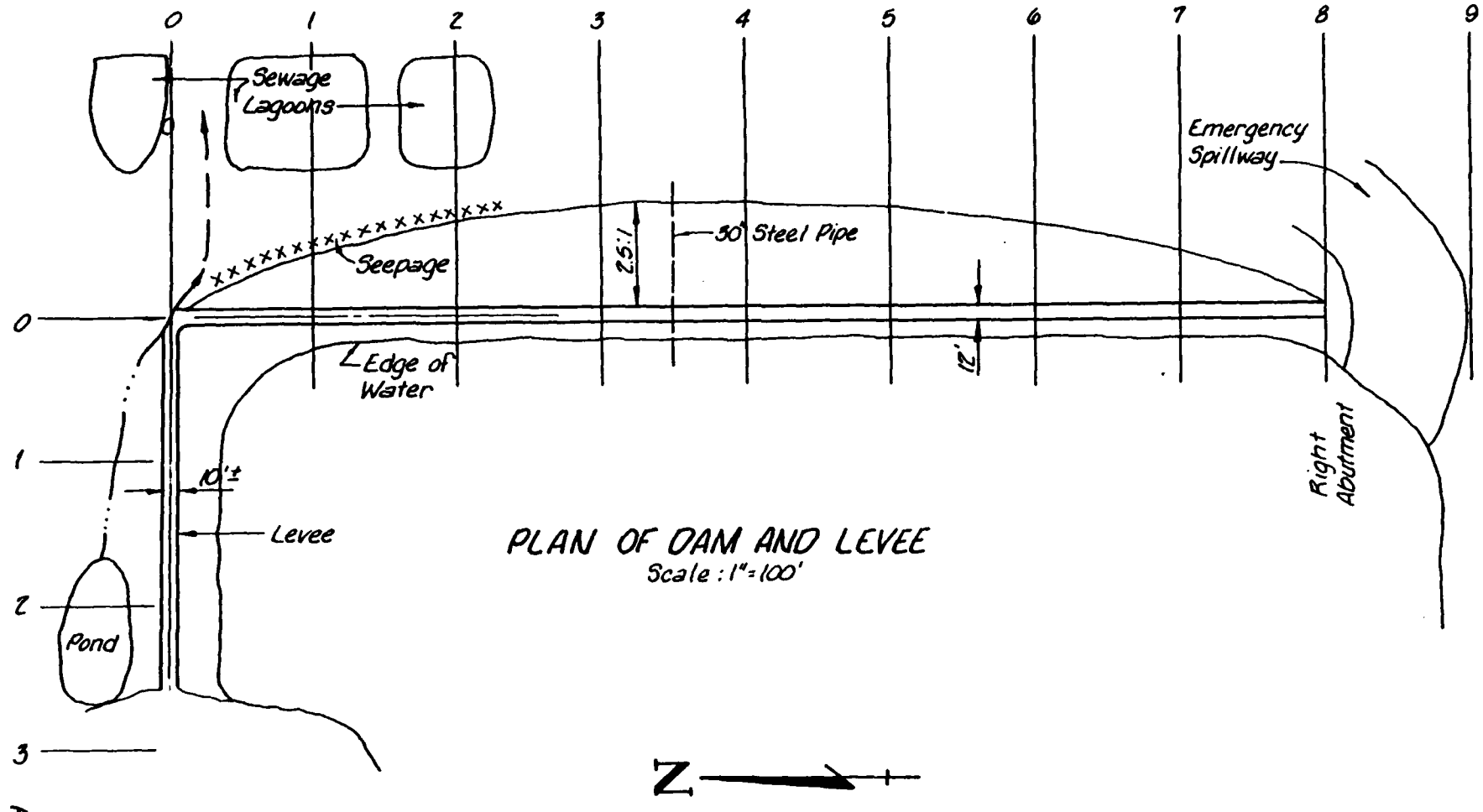


PHOTO NO. 15 - INLET OF PRINCIPAL SPILLWAY

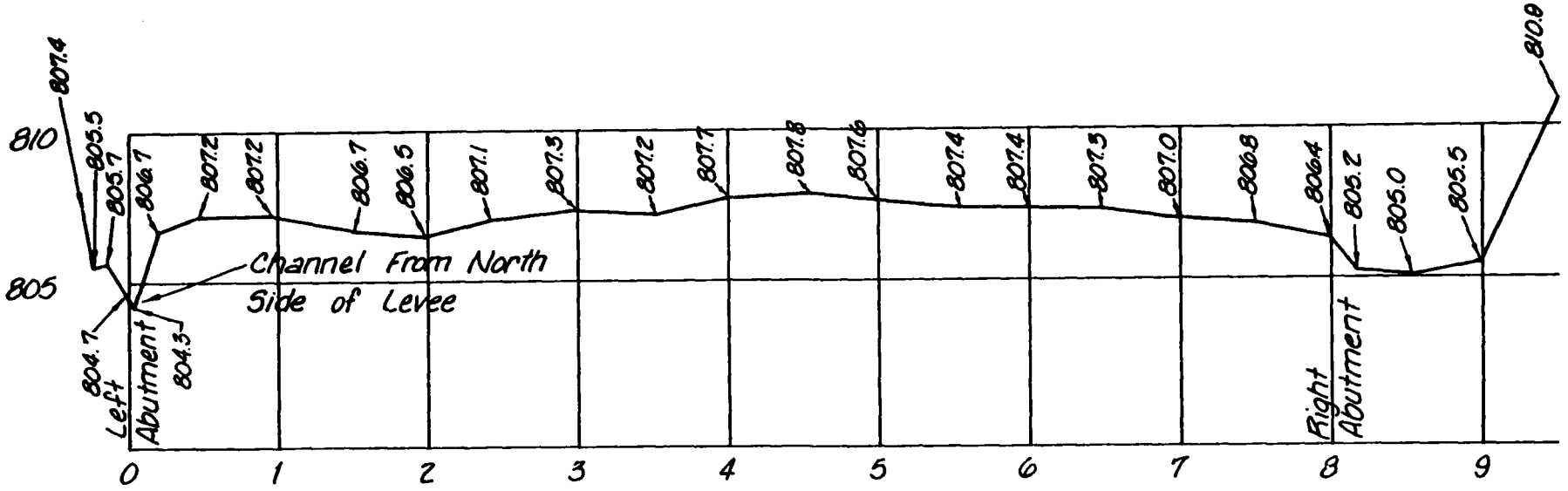
APPENDIX C
PROJECT PLATES



PLAN OF DAM AND LEVEE

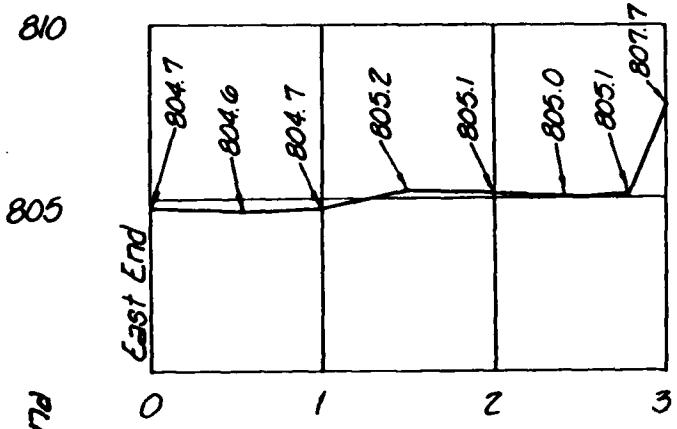
Scale : 1" = 100'

PLATE C-1



CENTERLINE PROFILE OF MAIN DAM

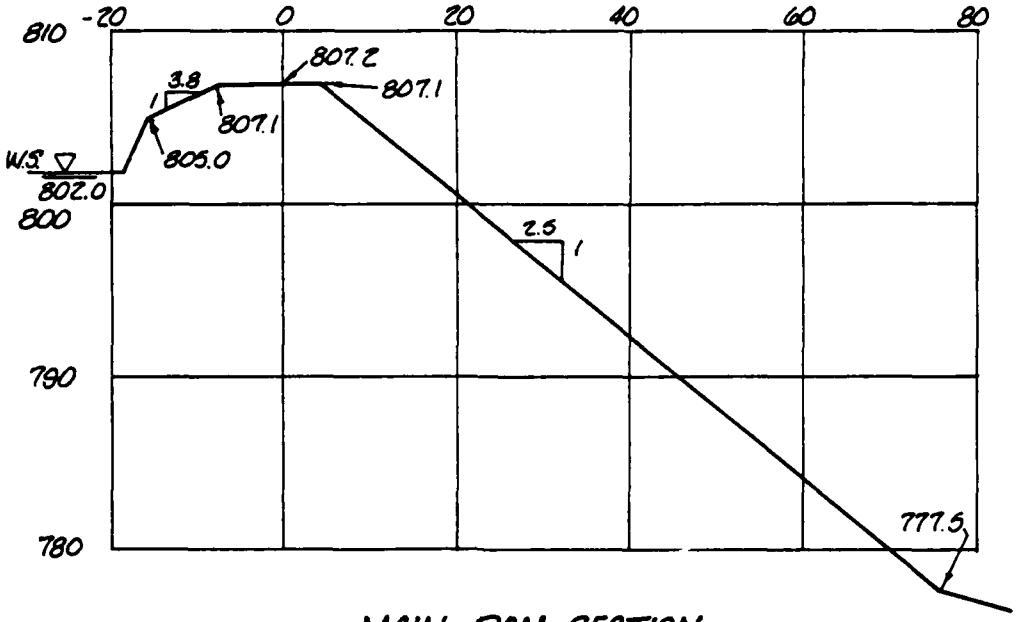
Scale: 1"=100'H.
1"=5'V.



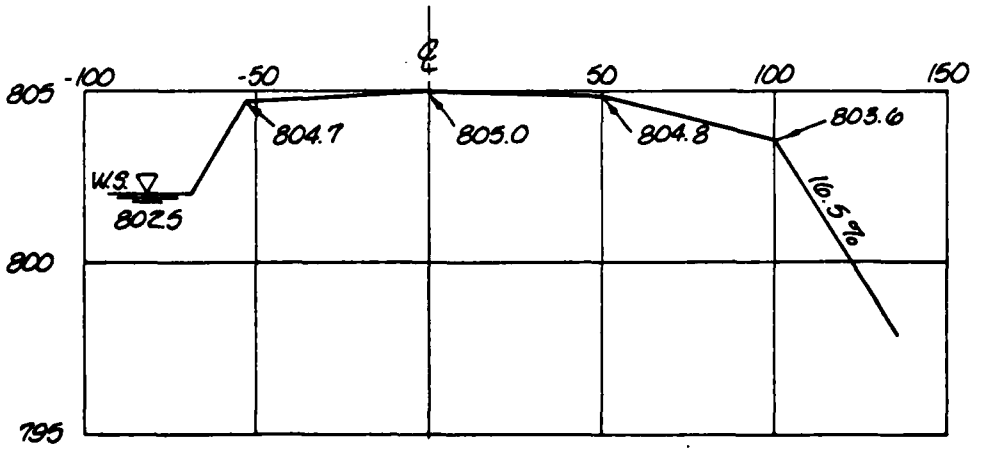
CENTERLINE PROFILE
LEVEE EXTENSION
Scale: 1"=100'H., 1"=5'V.

Note: 0+00 on Maindam = 0+00 on Levee

PLATE C-2



MAIN DAM SECTION
@ STA. 3+50
Scale: 1"=20'H
1"=10'V.



SPILLWAY CENTERLINE PROFILE
Scale: 1"=50'H
1"=10'V.

PLATE C-3

APPENDIX D
HYDRAULIC AND HYDROLOGIC DATA

HYDROLOGIC COMPUTATIONS

1. The SCS dimensionless unit hydrograph and the systemized computer program HEC-1 (Dam Safety Version), July, 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California, were used to develop the inflow hydrograph.

   a. The 24-hour, 10-year and 100-year rainfall for the dam location were taken from the data for the rainfall station at Jefferson City, Missouri, as supplied by the St. Louis District, Corps of Engineers, per their letter dated 6 March 1979. The 24-hour probable maximum precipitation was taken from the curves of Hydrometeorological Report No. 33 and current Corps of Engineers and St. Louis District policy and guidance for hydraulics and hydrology.

   b. Drainage area = 1.26 square miles (808 acres).

   c. Time of concentration of runoff = 0.68 hours, as computed by the SCS Upland Method.

   d. Antecedent moisture conditions for the probable maximum flood were assumed to be heavy rainfall and low temperatures for the previous five days (SCS AMC III). Antecedent moisture conditions for the 100-year flood were assumed to be an average of the conditions which have preceded the occurrence of the maximum annual flood on numerous watersheds (SCS AMC II).

   e. Initial pool elevation was assumed to be at the riser crest (Elev. 802.2).

   f. Total losses for the 24-hour 100-year storm were 2.11 inches. Total losses for the 24-hour PMP were 1.02 inches. The average loss rate for the 24-hour PMP was 0.04 inch per hour. Losses were determined using SCS CN 82 (AMC II) for the 24-hour, 100-year storm and SCS CN 92 (AMC III) for the PMP. Soils in the watershed are composed of approximately 14% SCS Soil Group B, 60% Soil Group C, and 26% Soil Group D. Land use in the watershed is approximately 50% cropland, 25% woods, and 25% pasture.

2. The discharge rating curve for the principal spillway was determined using the following equations.

   Full pipe flow:

$$Q = A\sqrt{\frac{2gH}{1 + K_e + K_b + K_pL}}$$, where

A = cross sectional area of 30" diameter pipe = 4.91 ft^2
H = total head above ℄ OF OUTLET, FT.
K_e= entrance loss coefficient = 0.50
K_b= bend loss coefficient = 0.36
K_p= pipe friction loss coefficient = 0.00786
L = effective pipe length = 101 ft.

Weir flow:

$Q = CLH^{3/2}$, where

C = weir coefficient = 3.1
L = weir length = circumference of 6' diameter riser = 18.85 ft.
H = total head above riser crest, ft.

Orifice flow:

$Q = CA_r\sqrt{2gH}$, where

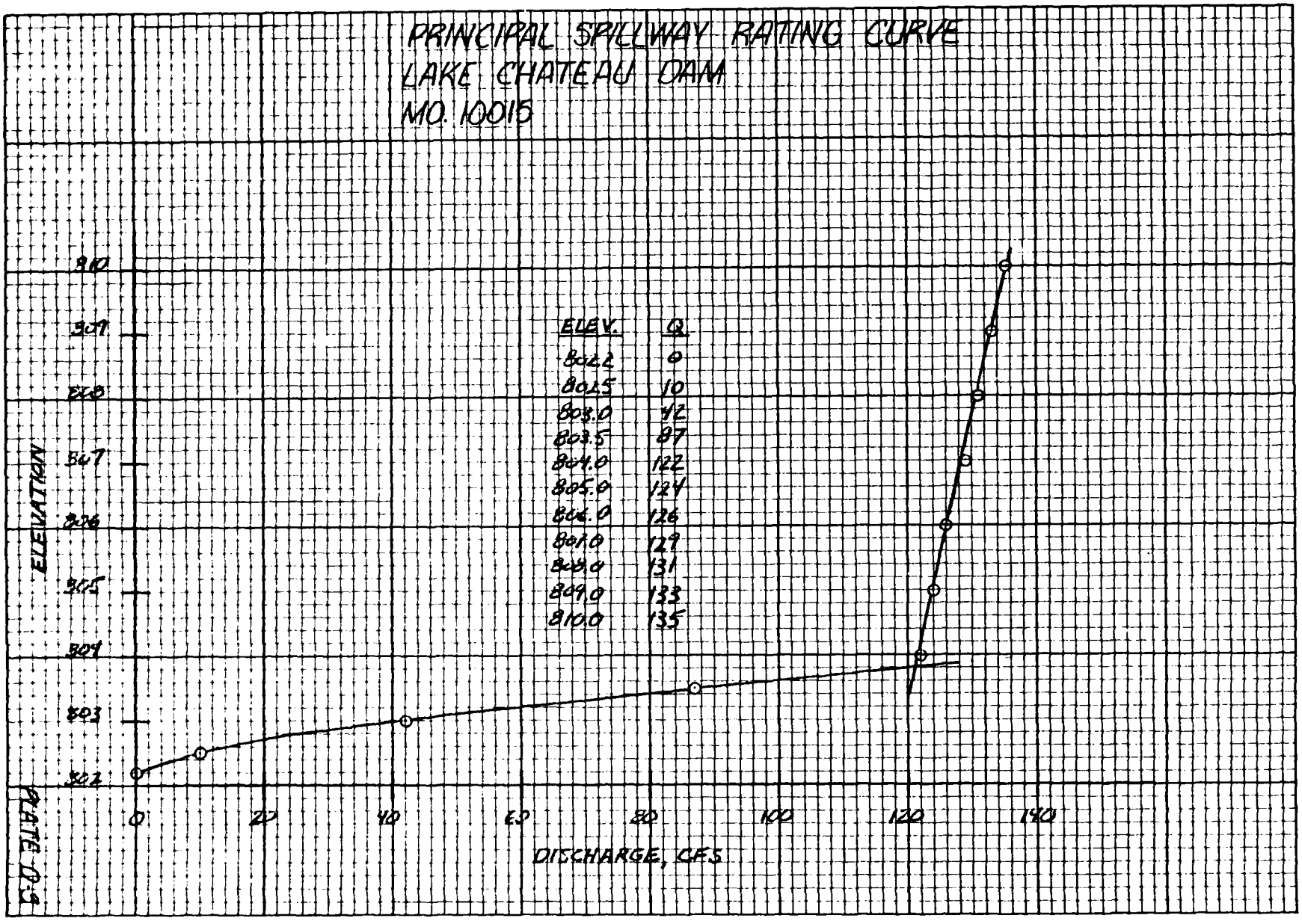
C = orifice coefficient = 0.6
A_r= cross sectional area of riser = 28.27 ft^2
H = total head above riser crest, ft.

Loss coefficients used in the full pipe flow equation were determined from the SCS National Engineering Handbook, Section 5, Hydraulics. Principal spillway discharges were controlled by weir flow over the riser crest for heads of 0.0 to 1.6 feet and by full flow in the 30-inch diameter pipe for heads greater than 1.6 feet.

The discharge rating for the emergency spillway was developed using the Corps of Engineers HEC-2 Water Surface Profiles computer program. The control section for the emergency spillway is approximately 50 feet downstream of the dam center line.

The discharge rating for flow over the dam crest, including levee extension at the left end of the dam, was developed using the option of the HEC-1 (Dam Safety Version) program for flow over a non-level dam crest.

3. Floods were routed through the reservoir using the HEC-1 (Dam Safety Verson) program. Input, output, and plotted hydrographs are included with this report.


PRINCIPAL SPILLWAY RATING CURVE
LAKE CHATEAU DAM
MO. 10015
ELEV. Q
802.2 0
802.5 10
803.0 42
803.5 87
804.0 122
805.0 124
806.0 126
807.0 129
808.0 131
809.0 133
810.0 135
ELEVATION
810
807
805
803
802
0
20
40
60
80
100
120
140
DISCHARGE, CFS
PLATE D-9

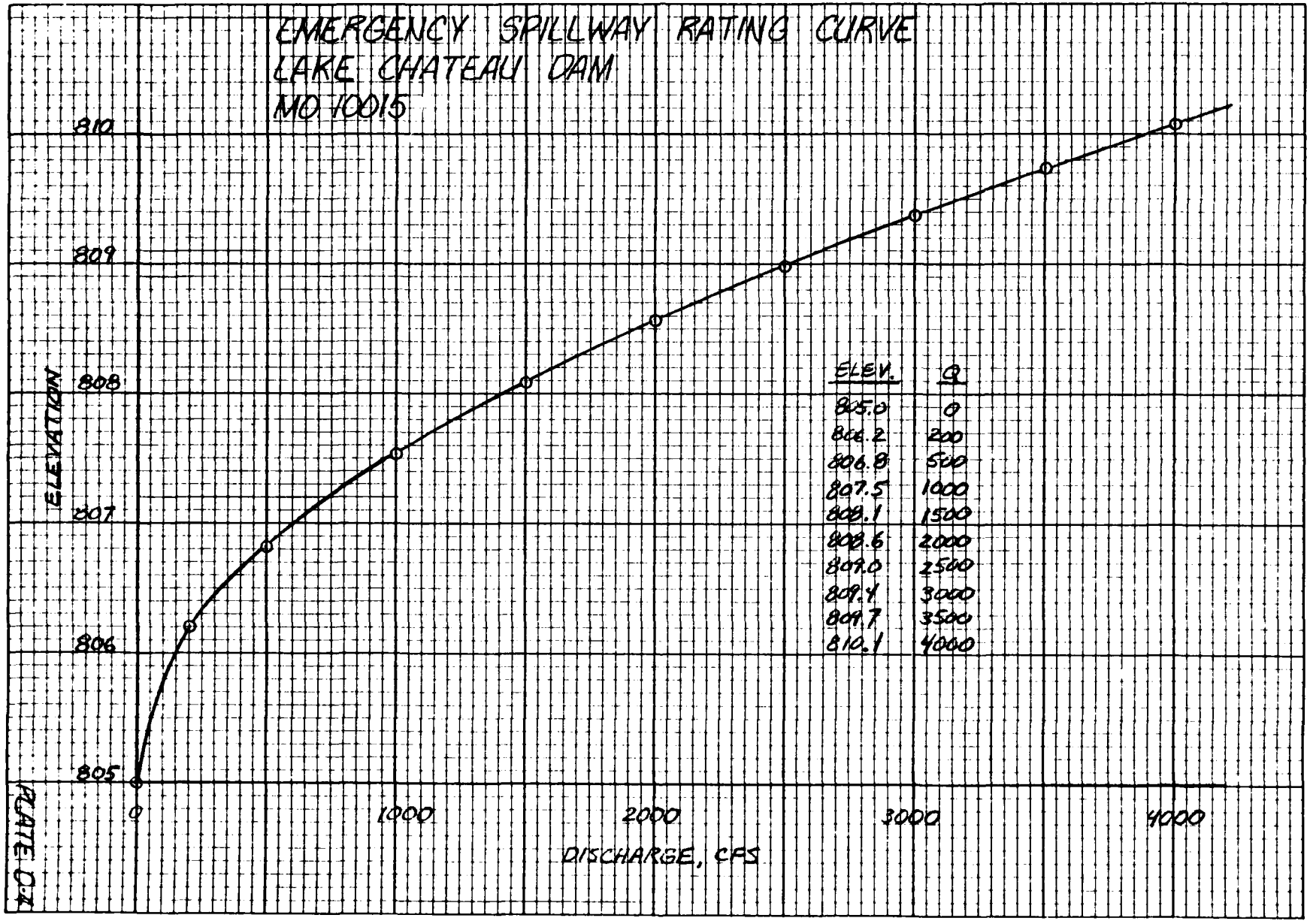
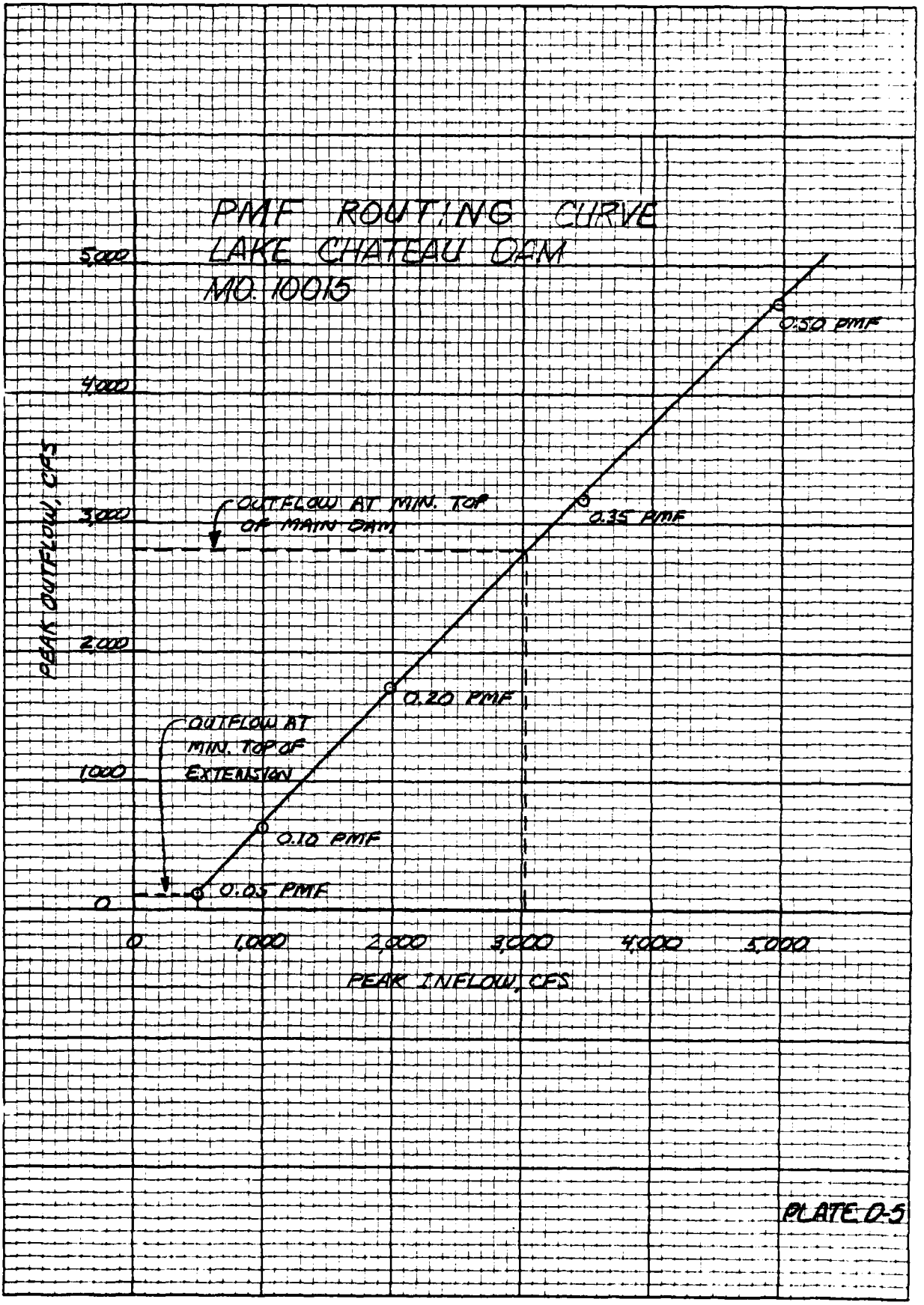

EMERGENCY SPILLWAY RATING CURVE
LAKE CHATEAU DAM
MO 10015
ELEVATION
810
809
808
807
806
805
0
1000
2000
3000
4000
DISCHARGE, CFS
ELEV. Q
805.0 0
806.2 200
806.8 500
807.5 1000
808.1 1500
808.6 2000
809.0 2500
809.4 3000
809.7 3500
810.1 4000

PLATE D-1


PMF ROUTING CURVE
LAKE CHATEAU DAM
MO. 10015
PEAK OUTFLOW, CFS
5,000
4,000
3,000
2,000
1000
0
OUTFLOW AT MIN. TOP OF MAIN DAM
OUTFLOW AT MIN. TOP OF EXTENSION
0.50 PMF
0.35 PMF
0.20 PMF
0.10 PMF
0.05 PMF
0
1,000
2,000
3,000
4,000
5,000
PEAK INFLOW, CFS
PLATE D-5

```
A1       MISSOURI DAM SAFETY INSPECTIONS
A2       LAKE CHATEAU DAM MO 10015
A3       RATIOS OF PMF
B 0002880000000000000005                                          00000003
B1000005
J 0000010000003730000001
J1000.1000000.2000000.3500000.5000000.6500000.80000001.0
K        00000001              00000002        00000001
K1       CALCULATION OF INFLOW HYDROGRAPHS TO LAKE CHATEAU DAM
M 0000010000000200001.26              000001.0              00000001
P        000024.80000192.0000121.0000130.
T                                              -1.    -92.
W2       00000.41
X 00000.    -.010000001.
K 0000010000000002              00000002        00000001
K1       RESERVOIR ROUTING OF HYDROGRAPHS THRU LAKE CHATEAU DAM
Y                     0000000100000001
Y1J00001                                       -802.2      -1
Y400802.2000802.50000803.000803.5000803.80000804.0000805.0000806.0000807.0000808.
Y4G0809.0000810.
Y5C0000.0000010.0000042.0000087.0000121.0000122.0000124.0000280.0000750.0001560.
Y5J2630.0004040.
$A00000.0000025.0000037.0000083.0000139.
$E00780.0000802.0000810.0000820.0000830.
$G0802.2
$D0804.6000003.0000001.50001125.
$L00110.0000285.0000400.0000780.0000960.0001100.0001125.
$V0804.6000805.1000806.7000807.2000807.5000807.80000810.
K J00399
A
A
A
A
A
```

PLATE D-6

****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

RUN DATE= 79/07/13.
TIME= 15.18.56.

MISSOURI DAM SAFETY INSPECTIONS
LAKE CHATEAU DAM MO 10015
RATIOS OF PMF

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	5	0	0	0	0	0	3	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 7 LRTIO= 1
RTIOS= .10 .20 .35 .50 .65 .80 1.00

****

SUB-AREA RUNOFF COMPUTATION

CALCULATION OF INFLOW HYDROGRAPHS TO LAKE CHATEAU DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
000001	0	0	0	2	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	1.26	0.00	1.26	1.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	24.80	102.00	121.00	130.00	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-92.00	0.00	0.00

CURVE NO = -92.00 WETNESS = -1.00 EFFECT CN = 92.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .41

RECESSION DATA
STRTQ= 0.00 QRCSN= -.01 RTIOR= 1.00

UNIT HYDROGRAPH 27 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .41 VOL= 1.00

120.	367.	770.	1160.	1336.	1327.	1166.	948.	673.	489.
363.	273.	199.	149.	110.	81.	60.	45.	33.	25.
18.	14.	11.	8.	5.	3.	0.			

PLATE D-7

Q MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	0.00	.01	0.	1.01	12.05	145	.21	.21	.00	642.
1.01	.10	2	.01	0.00	.01	0.	1.01	12.10	146	.21	.21	.00	694.
1.01	.15	3	.01	0.00	.01	0.	1.01	12.15	147	.21	.21	.00	805.
1.01	.20	4	.01	0.00	.01	0.	1.01	12.20	148	.21	.21	.00	971.
1.01	.25	5	.01	0.00	.01	0.	1.01	12.25	149	.21	.21	.00	1162.
1.01	.30	6	.01	0.00	.01	0.	1.01	12.30	150	.21	.21	.00	1353.
1.01	.35	7	.01	0.00	.01	0.	1.01	12.35	151	.21	.21	.00	1520.
1.01	.40	8	.01	0.00	.01	0.	1.01	12.40	152	.21	.21	.00	1657.
1.01	.45	9	.01	0.00	.01	0.	1.01	12.45	153	.21	.21	.00	1754.
1.01	.50	10	.01	0.00	.01	0.	1.01	12.50	154	.21	.21	.00	1825.
1.01	.55	11	.01	0.00	.01	0.	1.01	12.55	155	.21	.21	.00	1879.
1.01	1.00	12	.01	0.00	.01	0.	1.01	13.00	156	.21	.21	.00	1919.
1.01	1.05	13	.01	0.00	.01	0.	1.01	13.05	157	.25	.25	.00	1954.
1.01	1.10	14	.01	0.00	.01	0.	1.01	13.10	158	.25	.25	.00	1992.
1.01	1.15	15	.01	.00	.01	0.	1.01	13.15	159	.25	.25	.00	2041.
1.01	1.20	16	.01	.00	.01	0.	1.01	13.20	160	.25	.25	.00	2102.
1.01	1.25	17	.01	.00	.01	0.	1.01	13.25	161	.25	.25	.00	2168.
1.01	1.30	18	.01	.00	.01	1.	1.01	13.30	162	.25	.25	.00	2231.
1.01	1.35	19	.01	.00	.01	2.	1.01	13.35	163	.25	.25	.00	2285.
1.01	1.40	20	.01	.00	.01	3.	1.01	13.40	164	.25	.25	.00	2330.
1.01	1.45	21	.01	.00	.01	5.	1.01	13.45	165	.25	.25	.00	2361.
1.01	1.50	22	.01	.00	.01	7.	1.01	13.50	166	.25	.25	.00	2385.
1.01	1.55	23	.01	.00	.01	10.	1.01	13.55	167	.25	.25	.00	2402.
1.01	2.00	24	.01	.00	.01	12.	1.01	14.00	168	.25	.25	.00	2416.
1.01	2.05	25	.01	.00	.01	15.	1.01	14.05	169	.32	.31	.00	2433.
1.01	2.10	26	.01	.00	.01	17.	1.01	14.10	170	.32	.31	.00	2464.
1.01	2.15	27	.01	.00	.01	20.	1.01	14.15	171	.32	.31	.00	2518.
1.01	2.20	28	.01	.00	.01	22.	1.01	14.20	172	.32	.31	.00	2595.
1.01	2.25	29	.01	.00	.01	24.	1.01	14.25	173	.32	.31	.00	2682.
1.01	2.30	30	.01	.00	.01	27.	1.01	14.30	174	.32	.31	.00	2768.
1.01	2.35	31	.01	.00	.01	29.	1.01	14.35	175	.32	.31	.00	2844.
1.01	2.40	32	.01	.00	.01	31.	1.01	14.40	176	.32	.32	.00	2905.
1.01	2.45	33	.01	.00	.01	33.	1.01	14.45	177	.32	.32	.00	2949.
1.01	2.50	34	.01	.00	.01	35.	1.01	14.50	178	.32	.32	.00	2981.
1.01	2.55	35	.01	.00	.01	37.	1.01	14.55	179	.32	.32	.00	3005.
1.01	3.00	36	.01	.01	.01	39.	1.01	15.00	180	.32	.32	.00	3023.
1.01	3.05	37	.01	.01	.01	41.	1.01	15.05	181	.19	.19	.00	3021.
1.01	3.10	38	.01	.01	.01	43.	1.01	15.10	182	.38	.38	.00	3009.
1.01	3.15	39	.01	.01	.01	45.	1.01	15.15	183	.38	.38	.00	2991.
1.01	3.20	40	.01	.01	.01	46.	1.01	15.20	184	.58	.58	.00	3024.
1.01	3.25	41	.01	.01	.01	48.	1.01	15.25	185	.67	.67	.00	3168.
1.01	3.30	42	.01	.01	.01	50.	1.01	15.30	186	1.63	1.63	.00	3561.
1.01	3.35	43	.01	.01	.01	51.	1.01	15.35	187	2.69	2.69	.00	4449.
1.01	3.40	44	.01	.01	.01	53.	1.01	15.40	188	1.06	1.06	.00	5856.
1.01	3.45	45	.01	.01	.01	54.	1.01	15.45	189	.67	.67	.00	7620.
1.01	3.50	46	.01	.01	.01	56.	1.01	15.50	190	.58	.58	.00	9140.
1.01	3.55	47	.01	.01	.01	57.	1.01	15.55	191	.38	.38	.00	9921.
1.01	4.00	48	.01	.01	.01	58.	1.01	16.00	192	.38	.38	.00	9929.
1.01	4.05	49	.01	.01	.01	59.	1.01	16.05	193	.30	.29	.00	9309.
1.01	4.10	50	.01	.01	.01	61.	1.01	16.10	194	.30	.29	.00	8297.
1.01	4.15	51	.01	.01	.01	62.	1.01	16.15	195	.30	.29	.00	7132.
1.01	4.20	52	.01	.01	.01	63.	1.01	16.20	196	.30	.29	.00	6141.
1.01	4.25	53	.01	.01	.01	64.	1.01	16.25	197	.30	.29	.00	5352.
1.01	4.30	54	.01	.01	.01	65.	1.01	16.30	198	.30	.29	.00	4728.
1.01	4.35	55	.01	.01	.00	66.	1.01	16.35	199	.30	.29	.00	4247.
1.01	4.40	56	.01	.01	.00	67.	1.01	16.40	200	.30	.29	.00	3890.
1.01	4.45	57	.01	.01	.00	68.	1.01	16.45	201	.30	.29	.00	3627.
1.01	4.50	58	.01	.01	.00	69.	1.01	16.50	202	.30	.29	.00	3431.
1.01	4.55	59	.01	.01	.00	70.	1.01	16.55	203	.30	.29	.00	3288.

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1.01	5.00	60	.01	.01	.00	71.	1.01	17.00	204	.30	.29	.00	3181.
1.01	5.05	61	.01	.01	.00	72.	1.01	17.05	205	.23	.23	.00	3095.
1.01	5.10	62	.01	.01	.00	73.	1.01	17.10	206	.23	.23	.00	3013.
1.01	5.15	63	.01	.01	.00	74.	1.01	17.15	207	.23	.23	.00	2921.
1.01	5.20	64	.01	.01	.00	75.	1.01	17.20	208	.23	.23	.00	2817.
1.01	5.25	65	.01	.01	.00	76.	1.01	17.25	209	.23	.23	.00	2709.
1.01	5.30	66	.01	.01	.00	76.	1.01	17.30	210	.23	.23	.00	2605.
1.01	5.35	67	.01	.01	.00	77.	1.01	17.35	211	.23	.23	.00	2515.
1.01	5.40	68	.01	.01	.00	78.	1.01	17.40	212	.23	.23	.00	2441.
1.01	5.45	69	.01	.01	.00	79.	1.01	17.45	213	.23	.23	.00	2388.
1.01	5.50	70	.01	.01	.00	79.	1.01	17.50	214	.23	.23	.00	2352.
1.01	5.55	71	.01	.01	.00	80.	1.01	17.55	215	.23	.23	.00	2327.
1.01	6.00	72	.01	.01	.00	81.	1.01	18.00	216	.23	.23	.00	2308.
1.01	6.05	73	.07	.05	.02	86.	1.01	18.05	217	.02	.02	.00	2270.
1.01	6.10	74	.07	.05	.02	101.	1.01	18.10	218	.02	.02	.00	2182.
1.01	6.15	75	.07	.05	.02	131.	1.01	18.15	219	.02	.02	.00	2011.
1.01	6.20	76	.07	.05	.01	177.	1.01	18.20	220	.02	.02	.00	1758.
1.01	6.25	77	.07	.05	.01	231.	1.01	18.25	221	.02	.02	.00	1470.
1.01	6.30	78	.07	.05	.01	287.	1.01	18.30	222	.02	.02	.00	1184.
1.01	6.35	79	.07	.05	.01	338.	1.01	18.35	223	.02	.02	.00	934.
1.01	6.40	80	.07	.05	.01	381.	1.01	18.40	224	.02	.02	.00	730.
1.01	6.45	81	.07	.05	.01	414.	1.01	18.45	225	.02	.02	.00	586.
1.01	6.50	82	.07	.06	.01	441.	1.01	18.50	226	.02	.02	.00	481.
1.01	6.55	83	.07	.06	.01	463.	1.01	18.55	227	.02	.02	.00	403.
1.01	7.00	84	.07	.06	.01	481.	1.01	19.00	228	.02	.02	.00	344.
1.01	7.05	85	.07	.06	.01	496.	1.01	19.05	229	.02	.02	.00	301.
1.01	7.10	86	.07	.06	.01	508.	1.01	19.10	230	.02	.02	.00	269.
1.01	7.15	87	.07	.06	.01	519.	1.01	19.15	231	.02	.02	.00	246.
1.01	7.20	88	.07	.06	.01	528.	1.01	19.20	232	.02	.02	.00	229.
1.01	7.25	89	.07	.06	.01	536.	1.01	19.25	233	.02	.02	.00	216.
1.01	7.30	90	.07	.06	.01	543.	1.01	19.30	234	.02	.02	.00	206.
1.01	7.35	91	.07	.06	.01	549.	1.01	19.35	235	.02	.02	.00	199.
1.01	7.40	92	.07	.06	.01	554.	1.01	19.40	236	.02	.02	.00	194.
1.01	7.45	93	.07	.06	.01	559.	1.01	19.45	237	.02	.02	.00	190.
1.01	7.50	94	.07	.06	.01	564.	1.01	19.50	238	.02	.02	.00	187.
1.01	7.55	95	.07	.06	.01	568.	1.01	19.55	239	.02	.02	.00	185.
1.01	8.00	96	.07	.06	.01	572.	1.01	20.00	240	.02	.02	.00	183.
1.01	8.05	97	.07	.06	.00	575.	1.01	20.05	241	.02	.02	.00	182.
1.01	8.10	98	.07	.06	.00	578.	1.01	20.10	242	.02	.02	.00	181.
1.01	8.15	99	.07	.06	.00	581.	1.01	20.15	243	.02	.02	.00	181.
1.01	8.20	100	.07	.06	.00	583.	1.01	20.20	244	.02	.02	.00	181.
1.01	8.25	101	.07	.06	.00	586.	1.01	20.25	245	.02	.02	.00	181.
1.01	8.30	102	.07	.06	.00	588.	1.01	20.30	246	.02	.02	.00	181.
1.01	8.35	103	.07	.06	.00	590.	1.01	20.35	247	.02	.02	.00	181.
1.01	8.40	104	.07	.06	.00	592.	1.01	20.40	248	.02	.02	.00	181.
1.01	8.45	105	.07	.06	.00	594.	1.01	20.45	249	.02	.02	.00	181.
1.01	8.50	106	.07	.06	.00	595.	1.01	20.50	250	.02	.02	.00	181.
1.01	8.55	107	.07	.06	.00	597.	1.01	20.55	251	.02	.02	.00	181.
1.01	9.00	108	.07	.06	.00	599.	1.01	21.00	252	.02	.02	.00	181.
1.01	9.05	109	.07	.06	.00	600.	1.01	21.05	253	.02	.02	.00	181.
1.01	9.10	110	.07	.06	.00	601.	1.01	21.10	254	.02	.02	.00	181.
1.01	9.15	111	.07	.06	.00	603.	1.01	21.15	255	.02	.02	.00	181.
1.01	9.20	112	.07	.06	.00	604.	1.01	21.20	256	.02	.02	.00	181.
1.01	9.25	113	.07	.06	.00	605.	1.01	21.25	257	.02	.02	.00	181.
1.01	9.30	114	.07	.06	.00	606.	1.01	21.30	258	.02	.02	.00	181.
1.01	9.35	115	.07	.06	.00	607.	1.01	21.35	259	.02	.02	.00	181.
1.01	9.40	116	.07	.06	.00	608.	1.01	21.40	260	.02	.02	.00	181.
1.01	9.45	117	.07	.06	.00	609.	1.01	21.45	261	.02	.02	.00	181.
1.01	9.50	118	.07	.06	.00	610.	1.01	21.50	262	.02	.02	.00	181.
1.01	9.55	119	.07	.06	.00	611.	1.01	21.55	263	.02	.02	.00	181.
1.01	10.00	120	.07	.06	.00	612.	1.01	22.00	264	.02	.02	.00	181.
1.01	10.05	121	.07	.06	.00	613.	1.01	22.05	265	.02	.02	.00	181.

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1.01	10.10	122	.07	.06	.00	613.	1.01	22.10	266	.02	.02	.00	181.
1.01	10.15	123	.07	.06	.00	614.	1.01	22.15	267	.02	.02	.00	181.
1.01	10.20	124	.07	.06	.00	615.	1.01	22.20	268	.02	.02	.00	181.
1.01	10.25	125	.07	.06	.00	616.	1.01	22.25	269	.02	.02	.00	181.
1.01	10.30	126	.07	.06	.00	616.	1.01	22.30	270	.02	.02	.00	181.
1.01	10.35	127	.07	.06	.00	617.	1.01	22.35	271	.02	.02	.00	181.
1.01	10.40	128	.07	.06	.00	617.	1.01	22.40	272	.02	.02	.00	181.
1.01	10.45	129	.07	.06	.00	618.	1.01	22.45	273	.02	.02	.00	181.
1.01	10.50	130	.07	.06	.00	618.	1.01	22.50	274	.02	.02	.00	181.
1.01	10.55	131	.07	.06	.00	619.	1.01	22.55	275	.02	.02	.00	181.
1.01	11.00	132	.07	.06	.00	619.	1.01	23.00	276	.02	.02	.00	181.
1.01	11.05	133	.07	.06	.00	620.	1.01	23.05	277	.02	.02	.00	181.
1.01	11.10	134	.07	.06	.00	620.	1.01	23.10	278	.02	.02	.00	181.
1.01	11.15	135	.07	.06	.00	621.	1.01	23.15	279	.02	.02	.00	181.
1.01	11.20	136	.07	.06	.00	621.	1.01	23.20	280	.02	.02	.00	181.
1.01	11.25	137	.07	.06	.00	622.	1.01	23.25	281	.02	.02	.00	181.
1.01	11.30	138	.07	.06	.00	622.	1.01	23.30	282	.02	.02	.00	181.
1.01	11.35	139	.07	.06	.00	622.	1.01	23.35	283	.02	.02	.00	181.
1.01	11.40	140	.07	.06	.00	623.	1.01	23.40	284	.02	.02	.00	181.
1.01	11.45	141	.07	.06	.00	623.	1.01	23.45	285	.02	.02	.00	181.
1.01	11.50	142	.07	.06	.00	624.	1.01	23.50	286	.02	.02	.00	181.
1.01	11.55	143	.07	.06	.00	624.	1.01	23.55	287	.02	.02	.00	181.
1.01	12.00	144	.07	.06	.00	624.	1.02	0.00	288	.02	.02	.00	181.
									SUM	32.24	31.22	1.02	303363.
										(819.)(	793.)(	26.)(	8590.28)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9929.	3349.	1053.	1053.	303286.
CMS	281.	95.	30.	30.	8588.
INCHES		24.73	31.10	31.10	31.10
MM		628.07	789.90	789.90	789.90
AC-FT		1661.	2089.	2089.	2089.
THOUS CU M		2049.	2576.	2576.	2576.

PLATE D-10

OVN

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	993.	335.	105.	105.	30329.
CMS	28.	9.	3.	3.	859.
INCHES		2.47	3.11	3.11	3.11
MM		62.81	78.99	78.99	78.99
AC-FT		166.	209.	209.	209.
THOUS CU M		205.	258.	258.	258.

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 2

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1986.	670.	211.	211.	60657.
CMS	56.	19.	6.	6.	1718.
INCHES		4.95	6.22	6.22	6.22
MM		125.61	157.98	157.98	157.98
AC-FT		332.	418.	418.	418.
THOUS CU M		410.	515.	515.	515.

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 3

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3475.	1172.	369.	369.	106150.
CMS	98.	33.	10.	10.	3006.
INCHES		8.65	10.88	10.88	10.88
MM		219.83	276.47	276.47	276.47
AC-FT		581.	731.	731.	731.
THOUS CU M		717.	902.	902.	902.

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 4

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4965.	1675.	527.	527.	151643.
CMS	141.	47.	15.	15.	4294.
INCHES		12.36	15.55	15.55	15.55
MM		314.04	394.95	394.95	394.95
AC-FT		830.	1044.	1044.	1044.
THOUS CU M		1024.	1288.	1288.	1288.

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	6454.	2177.	684.	684.	197136.
CMS	183.	62.	19.	19.	5582.
INCHES		16.07	20.21	20.21	20.21
MM		408.25	513.44	513.44	513.44
AC-FT		1080.	1358.	1358.	1358.
THOUS CU M		1332.	1675.	1675.	1675.

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 6

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7944.	2679.	842.	842.	242629.
CMS	225.	76.	24.	24.	6870.
INCHES		19.78	24.88	24.88	24.88
MM		502.46	631.92	631.92	631.92
AC-FT		1329.	1671.	1671.	1671.
THOUS CU M		1639.	2061.	2061.	2061.

HYDROGRAPH AT STA000001 FOR PLAN 1, RTIO 7

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9929.	3349.	1053.	1053.	303286.
CMS	281.	95.	30.	30.	8588.
INCHES		24.73	31.10	31.10	31.10
MM		628.07	789.90	789.90	789.90
AC-FT		1661.	2089.	2089.	2089.
THOUS CU M		2049.	2576.	2576.	2576.

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HYDROGRAPH ROUTING

RESERVOIR ROUTING OF HYDROGRAPHS THRU LAKE CHATEAU DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
000002	1	0	0	2	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-802.	-1

STAGE	802.20	802.50	803.00	803.50	803.80	804.00	805.00	806.00	807.00	808.00
	809.00	810.00								
FLOW	0.00	10.00	42.00	87.00	121.00	122.00	124.00	280.00	750.00	1560.00
	2630.00	4040.00								
SURFACE AREA=	0.	25.	37.	83.	139.					
CAPACITY=	0.	183.	430.	1014.	2113.					
ELEVATION=	780.	802.	810.	820.	830.					

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
802.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
804.6	3.0	1.5	1125.

CREST LENGTH AT OR BELOW	110.	285.	400.	780.	960.	1100.	1125.

PLATE D-12

ELEVATION	804.6	805.1	806.7	807.2	807.5	807.8	810.0

STATION 000002, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	3.	3.	3.	3.
4.	4.	4.	5.	5.	6.	6.	6.	7.	7.
8.	8.	8.	9.	9.	10.	10.	11.	12.	13.
13.	14.	15.	16.	16.	17.	18.	19.	19.	20.
21.	21.	22.	23.	23.	24.	25.	25.	26.	26.
27.	27.	28.	29.	29.	30.	30.	31.	31.	32.
32.	33.	33.	34.	34.	35.	35.	36.	36.	36.
37.	37.	38.	38.	39.	39.	40.	40.	42.	43.
46.	48.	51.	54.	57.	60.	63.	66.	69.	73.
76.	79.	82.	86.	90.	94.	98.	102.	106.	110.
114.	118.	121.	121.	121.	122.	122.	122.	122.	122.
122.	122.	122.	123.	123.	123.	123.	123.	129.	171.
254.	388.	513.	600.	642.	648.	630.	599.	563.	526.
492.	461.	433.	410.	390.	373.	359.	345.	332.	320.
308.	298.	288.	279.	272.	265.	259.	254.	247.	240.
231.	220.	207.	195.	183.	172.	162.	153.	146.	140.
134.	130.	126.	124.	123.	123.	123.	123.	123.	123.
123.	123.	123.	123.	123.	123.	123.	123.	122.	122.
122.	122.	122.	122.	122.	122.	122.	122.	122.	122.
122.	122.	121.	121.	121.	121.	119.	116.	113.	110.
108.	105.	103.	101.	98.	96.	94.	92.	89.	87.
86.	84.	83.	81.	80.	78.	77.	76.		

STORAGE

188.	188.	188.	188.	188.	188.	188.	188.	188.	188.
188.	188.	188.	188.	188.	188.	188.	188.	188.	188.
188.	188.	188.	188.	188.	188.	188.	188.	188.	188.
188.	188.	189.	189.	189.	189.	189.	189.	189.	189.
189.	189.	189.	189.	189.	189.	189.	189.	189.	189.
189.	189.	189.	189.	189.	189.	189.	189.	189.	189.
189.	189.	190.	190.	190.	190.	190.	190.	190.	190.
190.	190.	190.	190.	190.	190.	190.	190.	191.	191.
191.	191.	192.	192.	192.	193.	193.	193.	194.	194.
194.	194.	195.	195.	195.	196.	196.	196.	197.	197.
197.	198.	198.	198.	199.	199.	199.	199.	200.	200.
200.	201.	201.	201.	201.	202.	202.	202.	202.	203.
203.	203.	203.	204.	204.	204.	204.	204.	205.	205.
205.	205.	205.	206.	206.	206.	206.	206.	207.	207.
207.	207.	207.	207.	208.	208.	208.	208.	209.	209.
210.	211.	212.	213.	213.	214.	215.	216.	217.	218.
219.	220.	221.	222.	223.	224.	225.	226.	227.	228.
229.	230.	231.	232.	233.	234.	235.	236.	238.	239.
240.	241.	243.	244.	245.	247.	248.	251.	255.	260.
265.	269.	273.	275.	276.	276.	276.	275.	274.	273.
272.	271.	271.	270.	269.	269.	268.	268.	268.	267.
267.	266.	266.	266.	265.	265.	265.	265.	264.	264.
264.	263.	262.	261.	261.	260.	259.	258.	257.	256.
256.	255.	254.	254.	253.	252.	251.	251.	250.	249.

PLATE D-13

•UVN•

STATION 000002, PLAN 1, RATIO 4 (0.50 PMF)

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
1.	1.	1.	1.	1.	2.	2.	2.	2.	2.
2.	3.	3.	3.	3.	3.	4.	4.	4.	4.
5.	5.	5.	5.	6.	6.	6.	6.	7.	7.
7.	7.	8.	8.	8.	8.	9.	9.	9.	9.
10.	10.	11.	11.	12.	13.	15.	17.	19.	22.
25.	28.	31.	35.	38.	42.	46.	51.	56.	61.
66.	71.	76.	80.	85.	90.	96.	101.	106.	111.
117.	121.	121.	121.	122.	122.	122.	122.	122.	122.
122.	122.	123.	123.	123.	123.	123.	123.	123.	123.
125.	131.	139.	148.	159.	170.	181.	193.	205.	216.
226.	236.	245.	254.	263.	271.	277.	283.	288.	292.
295.	298.	300.	302.	305.	310.	322.	344.	381.	432.
496.	565.	635.	701.	759.	810.	853.	890.	923.	955.
987.	1020.	1052.	1082.	1109.	1132.	1152.	1168.	1181.	1194.
1210.	1231.	1258.	1291.	1326.	1361.	1394.	1423.	1447.	1466.
1481.	1490.	1493.	1497.	1514.	1570.	1737.	2073.	2618.	3319.
4019.	4548.	4703.	4526.	4142.	3725.	3322.	2960.	2645.	2384.
2173.	2006.	1875.	1773.	1694.	1629.	1573.	1527.	1479.	1430.
1382.	1336.	1295.	1261.	1233.	1210.	1190.	1166.	1131.	1075.
996.	902.	799.	698.	605.	524.	456.	399.	352.	313.
281.	255.	236.	221.	208.	197.	187.	179.	172.	166.
160.	155.	151.	147.	144.	141.	139.	136.	134.	132.
131.	129.	128.	127.	126.	125.	124.	124.	123.	123.
123.	123.	123.	123.	123.	123.	123.	123.	123.	123.
123.	123.	123.	123.	123.	123.	123.	123.	123.	123.
123.	123.	123.	123.	123.	123.	123.	123.		

STORAGE

188.	188.	188.	188.	188.	188.	188.	188.	188.	188.
188.	188.	188.	188.	188.	188.	188.	188.	188.	188.
188.	188.	188.	188.	189.	189.	189.	189.	189.	189.
189.	189.	189.	189.	189.	190.	190.	190.	190.	190.
190.	190.	191.	191.	191.	191.	191.	191.	192.	192.
192.	192.	192.	192.	193.	193.	193.	193.	193.	194.
194.	194.	194.	194.	195.	195.	195.	195.	195.	196.
196.	196.	196.	196.	197.	197.	198.	199.	200.	201.
202.	203.	205.	206.	207.	209.	210.	212.	213.	215.
216.	218.	219.	220.	222.	223.	224.	226.	227.	228.
229.	231.	232.	233.	234.	235.	237.	238.	239.	240.
242.	243.	244.	245.	247.	248.	249.	250.	251.	253.
254.	255.	256.	257.	259.	260.	260.	261.	262.	263.
263.	264.	264.	265.	265.	265.	266.	266.	266.	266.
266.	266.	266.	267.	267.	267.	267.	268.	269.	271.
272.	274.	276.	277.	279.	280.	281.	282.	282.	283.
284.	284.	285.	286.	286.	287.	287.	287.	288.	288.
288.	288.	289.	290.	290.	291.	291.	292.	292.	293.
293.	293.	293.	293.	294.	294.	297.	302.	309.	317.
325.	329.	330.	329.	326.	321.	317.	313.	309.	306.
303.	301.	299.	297.	296.	295.	295.	294.	293.	292.
291.	290.	290.	289.	288.	288.	288.	287.	287.	285.
284.	282.	280.	277.	275.	273.	271.	270.	268.	267.
266.	265.	264.	263.	262.	262.	261.	260.	260.	259.

PLATE D-14

259.	258.	258.	257.	257.	257.	256.	256.	256.	255.
255.	255.	255.	254.	254.	254.	254.	253.	253.	253.
253.	253.	252.	252.	252.	252.	251.	251.	251.	251.
251.	250.	250.	250.	250.	249.	249.	249.	249.	249.
248.	248.	248.	248.	247.	247.	247.	247.		

STAGE

802.2	802.2	802.2	802.2	802.2	802.2	802.2	802.2	802.2	802.2
802.2	802.2	802.2	802.2	802.2	802.2	802.2	802.2	802.2	802.2
802.2	802.2	802.2	802.2	802.2	802.2	802.2	802.2	802.2	802.2
802.2	802.2	802.2	802.2	802.2	802.2	802.3	802.3	802.3	802.3
802.3	802.3	802.3	802.3	802.3	802.3	802.3	802.3	802.3	802.3
802.3	802.3	802.4	802.4	802.4	802.4	802.4	802.4	802.4	802.4
802.4	802.4	802.4	802.4	802.4	802.5	802.5	802.5	802.5	802.5
802.5	802.5	802.5	802.5	802.5	802.5	802.6	802.6	802.6	802.7
802.7	802.8	802.8	802.9	802.9	803.0	803.0	803.1	803.2	803.2
803.3	803.3	803.4	803.4	803.5	803.5	803.6	803.6	803.7	803.7
803.8	803.8	803.8	803.9	803.9	804.0	804.0	804.1	804.1	804.2
804.2	804.2	804.3	804.3	804.4	804.4	804.5	804.5	804.5	804.6
804.6	804.7	804.7	804.8	804.8	804.8	804.9	804.9	804.9	804.9
805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.1
805.1	805.1	805.1	805.1	805.1	805.1	805.1	805.1	805.2	805.2
805.3	805.3	805.4	805.4	805.5	805.5	805.6	805.6	805.6	805.6
805.6	805.7	805.7	805.7	805.7	805.7	805.8	805.8	805.8	805.8
805.8	805.8	805.8	805.8	805.9	805.9	805.9	805.9	805.9	805.9
805.9	806.0	806.0	806.0	806.0	806.0	806.1	806.2	(806.5	806.7
807.0	807.1	807.1	807.1	807.0	806.9	806.7	806.6	806.5)	806.4
806.3	806.2	806.1	806.1	806.1	806.0	806.0	806.0	805.9	805.9
805.9	805.9	805.8	805.8	805.8	805.8	805.8	805.8	805.7	805.7
805.7	805.6	805.5	805.4	805.4	805.3	805.2	805.2	805.1	805.1
805.0	805.0	805.0	804.9	804.9	804.9	804.9	804.9	804.8	804.8
804.8	804.8	804.8	804.8	804.7	804.7	804.7	804.7	804.7	804.7
804.7	804.7	804.7	804.6	804.6	804.6	804.6	804.6	804.6	804.6
804.6	804.6	804.6	804.6	804.6	804.6	804.5	804.5	804.5	804.5
804.5	804.5	804.5	804.5	804.5	804.5	804.5	804.5	804.5	804.4
804.4	804.4	804.4	804.4	804.4	804.4	804.4	804.4		

PEAK OUTFLOW IS 4703. AT TIME 16.08 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4703.	1661.	497.	497.	143152.
CMS	133.	47.	14.	14.	4054.
INCHES		12.26	14.68	14.68	14.68
MM		311.47	372.84	372.84	372.84
AC-FT		824.	986.	986.	986.
THOUS CU M		1016.	1216.	1216.	1216.

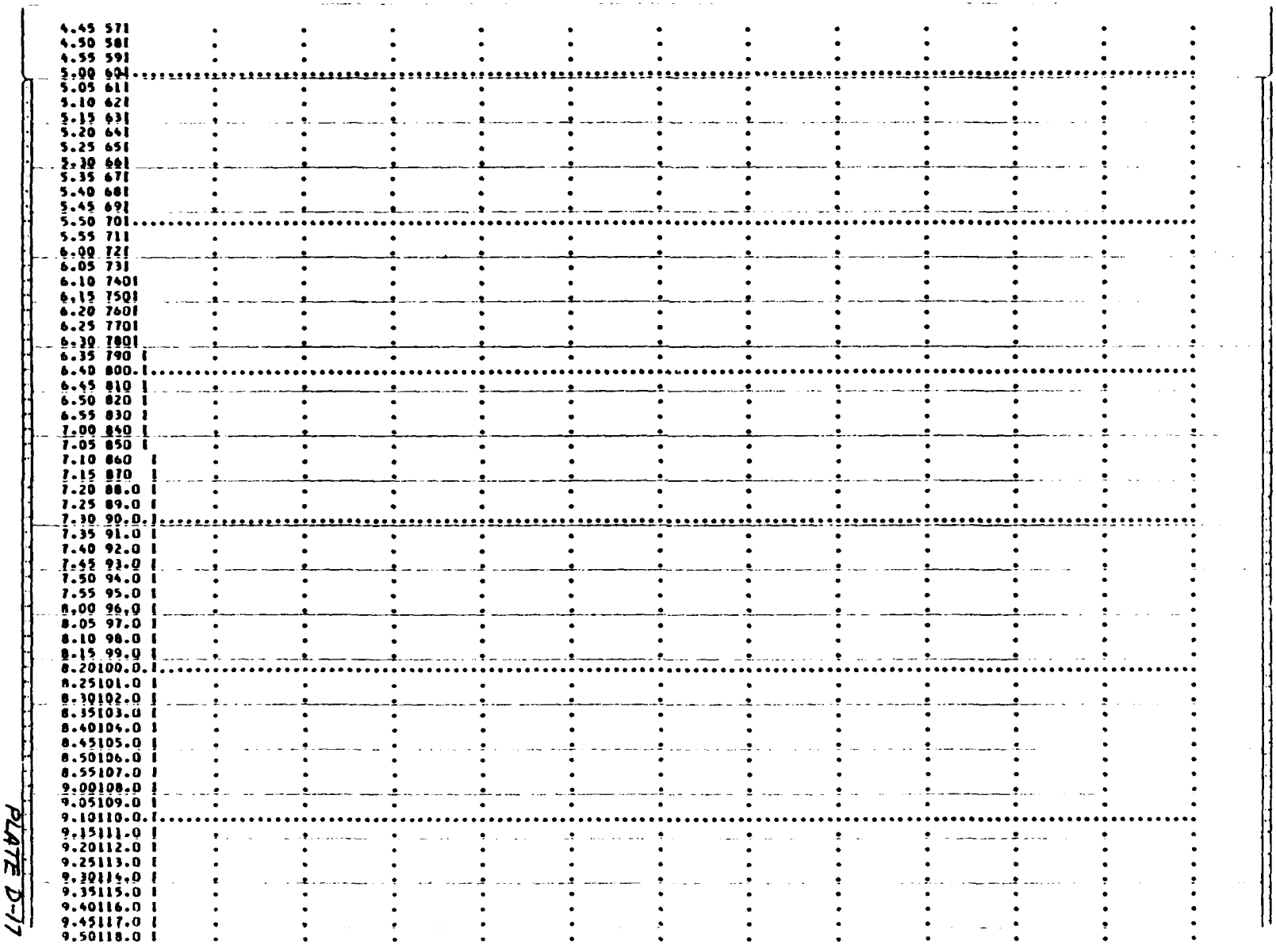
DVF

STATION000002

(INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	1000.	2000.	3000.	4000.	5000.	0.	0.	0.	0.	0.	0.	0.
.05	1I												
.10	2I												
.15	3I												
.20	4I												
.25	5I												
.30	6I												
.35	7I												
.40	8I												
.45	9I												
.50	10I												
.55	11I												
1.00	12I												
1.05	13I												
1.10	14I												
1.15	15I												
1.20	16I												
1.25	17I												
1.30	18I												
1.35	19I												
1.40	20I												
1.45	21I												
1.50	22I												
1.55	23I												
2.00	24I												
2.05	25I												
2.10	26I												
2.15	27I												
2.20	28I												
2.25	29I												
2.30	30I												
2.35	31I												
2.40	32I												
2.45	33I												
2.50	34I												
2.55	35I												
3.00	36I												
3.05	37I												
3.10	38I												
3.15	39I												
3.20	40I												
3.25	41I												
3.30	42I												
3.35	43I												
3.40	44I												
3.45	45I												
3.50	46I												
3.55	47I												
4.00	48I												
4.05	49I												
4.10	50I												
4.15	51I												
4.20	52I												
4.25	53I												
4.30	54I												
4.35	55I												
4.40	56I												

PLATE D-16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4.55 591
5.00 601
5.05 611
5.10 621
5.15 631
5.20 641
5.25 651
5.30 661
5.35 671
5.40 681
5.45 691
5.50 701
5.55 711
6.00 721
6.05 731
6.10 7401
6.15 7501
6.20 7601
6.25 7701
6.30 7801
6.35 790
6.40 800.
6.45 810
6.50 820
6.55 830
7.00 840
7.05 850
7.10 860
7.15 870
7.20 88.0
7.25 89.0
7.30 90.0.
7.35 91.0
7.40 92.0
7.45 93.0
7.50 94.0
7.55 95.0
8.00 96.0
8.05 97.0
8.10 98.0
8.15 99.0
8.20100.0.
8.25101.0
8.30102.0
8.35103.0
8.40104.0
8.45105.0
8.50106.0
8.55107.0
9.00108.0
9.05109.0
9.10110.0.
9.15111.0
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9.30114.0
9.35115.0
9.40116.0
9.45117.0
9.50118.0

PLATE D-17

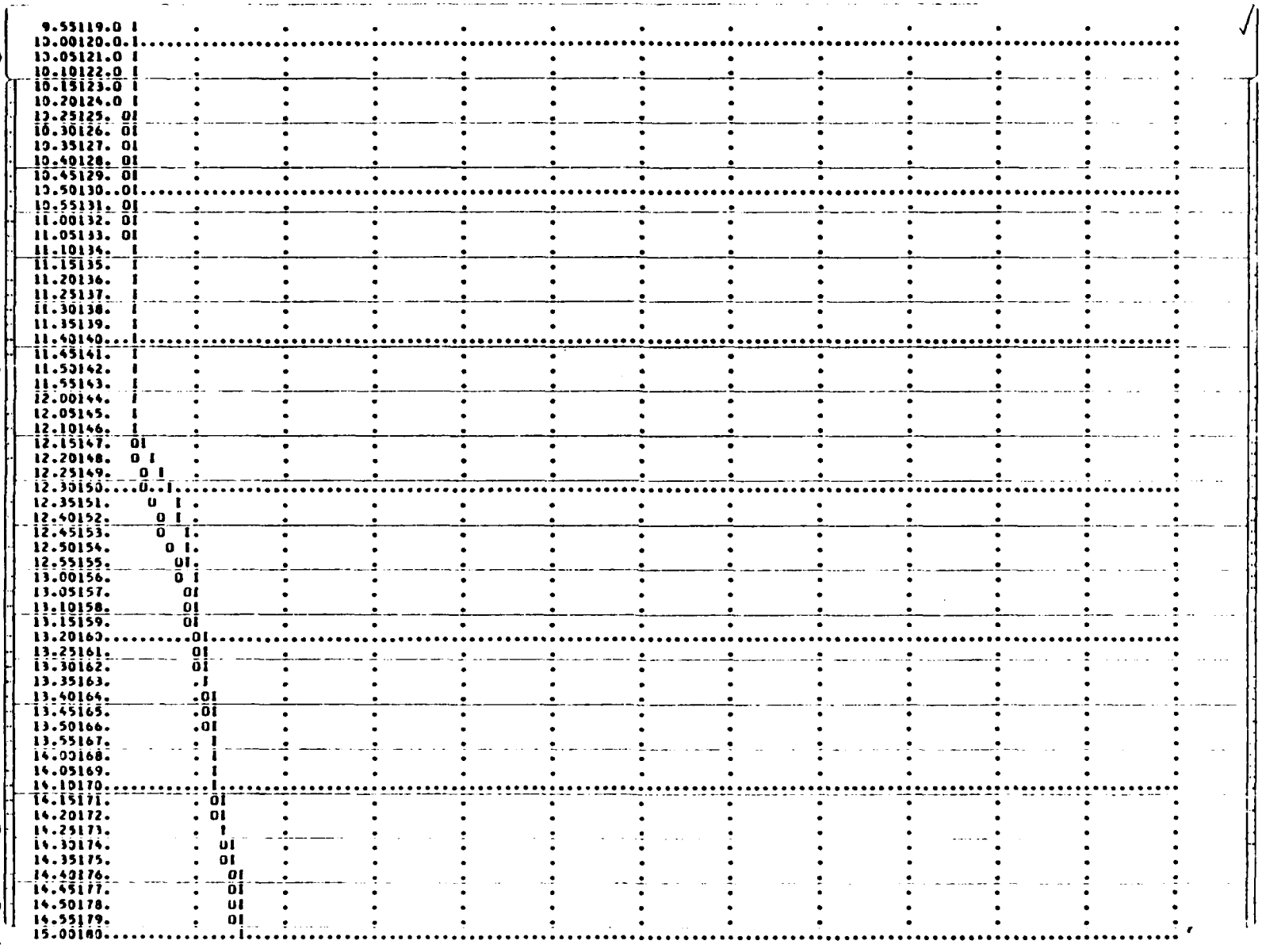
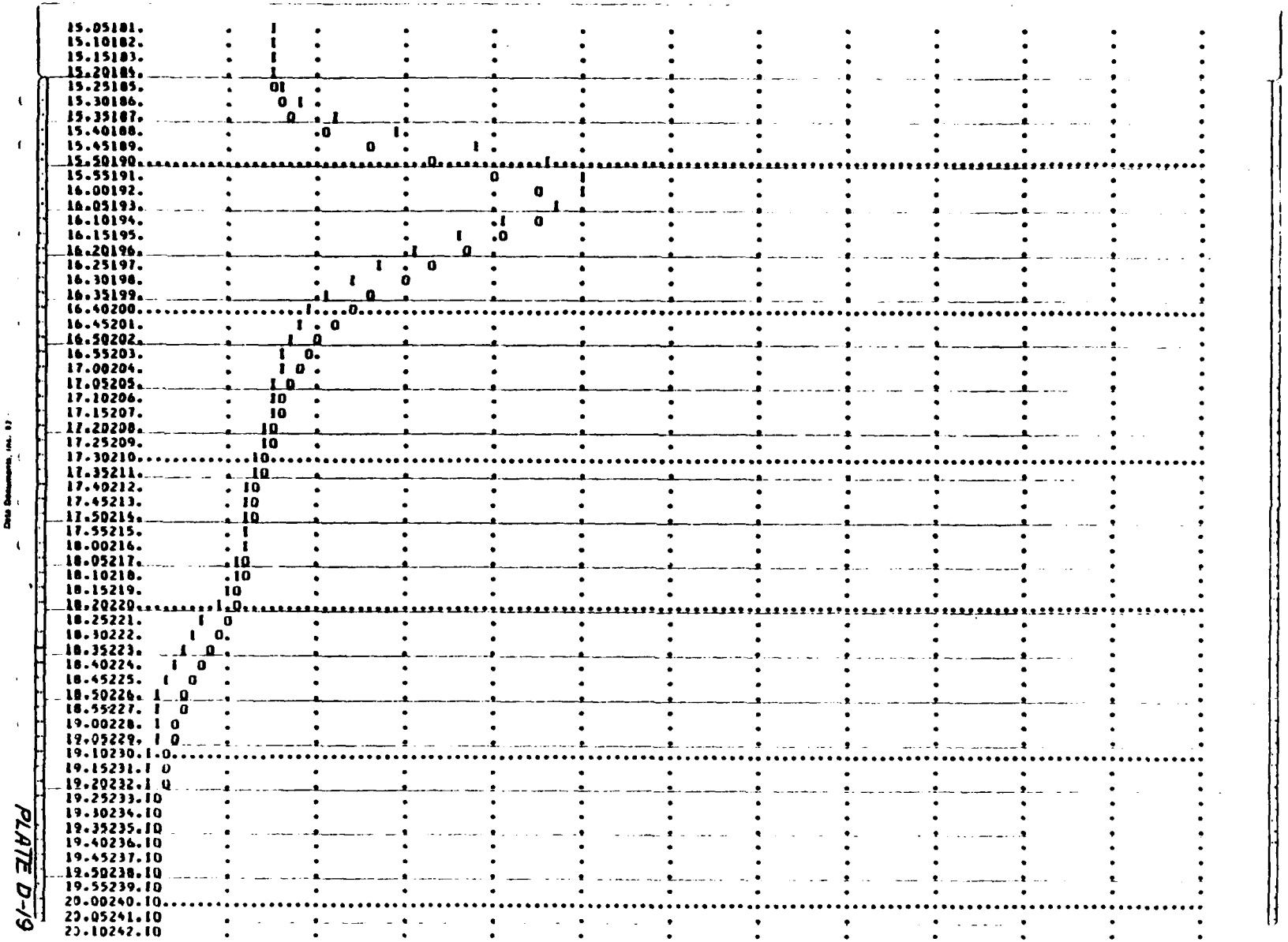


PLATE D-18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16.10194.
16.15195.
16.20196.
16.25197.
16.30198.
16.35199.
16.40200.
16.45201.
16.50202.
16.55203.
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18.10218.
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18.20220.
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18.45225.
18.50226.
18.55227.
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19.05229.
19.10230.
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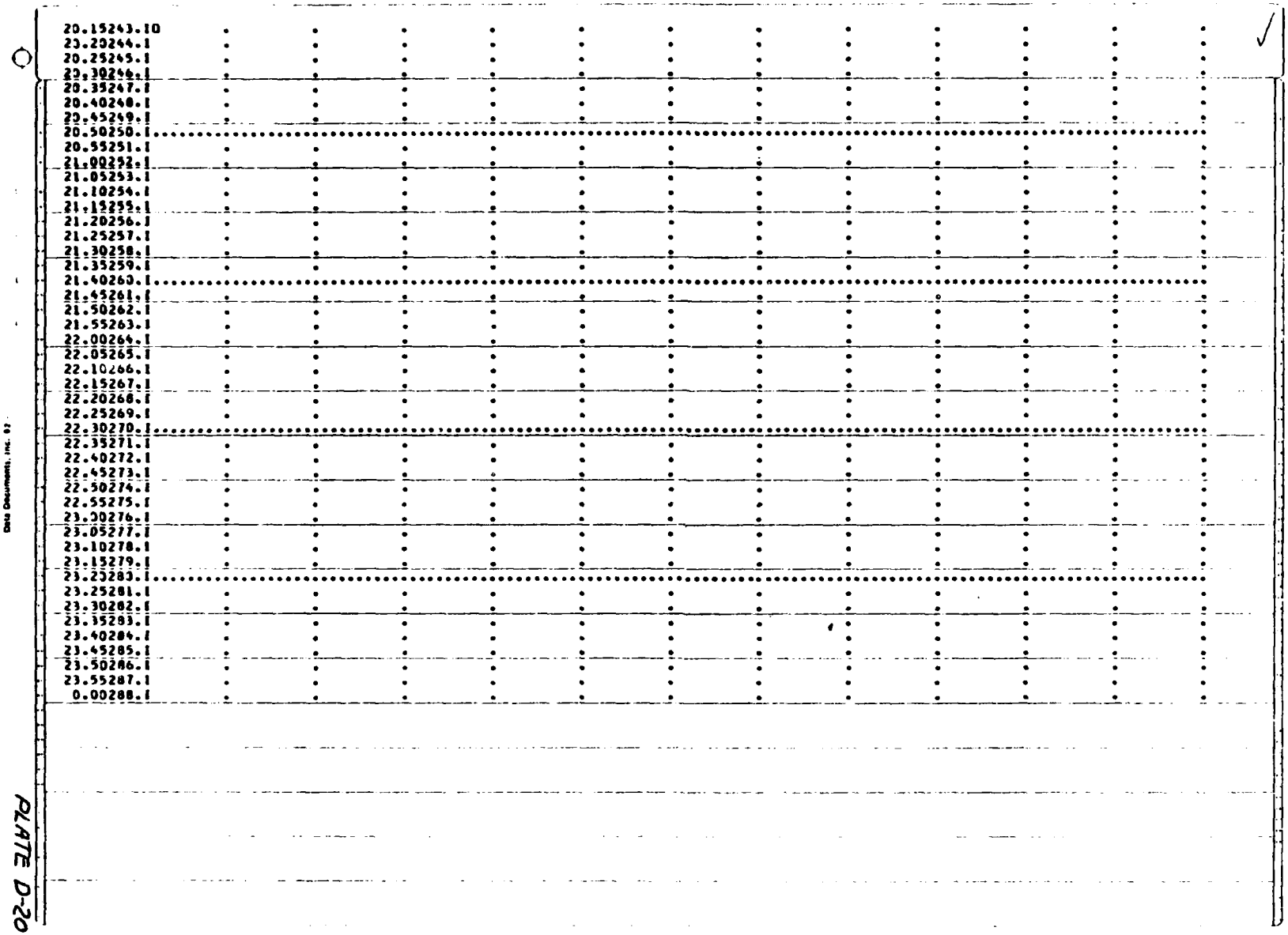
20.10242.

PLATE D-19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23.50286.1
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0.00288.1

PLATE D-20

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .20	RATIO 3 .35	RATIO 4 .50	RATIO 5 .65	RATIO 6 .80	RATIO 7 1.00
HYDROGRAPH AT	000001	1.26	1	993.	1986.	3475.	4965.	6454.	7944.	9929.
		(3.26)	(	28.12)(	56.23)(	98.41)(	140.59)(	182.76)(	224.94)(	281.17)(
ROUTED TO	000002	1.26	1	648.	1732.	3186.	4703.	6227.	7741.	9794.
		(3.26)	(	18.34)(	49.03)(	90.20)(	133.16)(	176.32)(	219.20)(	277.34)(

PLATE D-21

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	802.20	802.20	804.60
STORAGE	188.	188.	253.
OUTFLOW	0.	0.	123.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	805.39	.79	276.	648.	3.83	16.33	0.00
.20	806.07	1.47	297.	1732.	6.42	16.17	0.00
.35	806.67	2.07	315.	3186.	8.33	16.08	0.00
.50	807.14	2.54	330.	4703.	11.58	16.08	0.00
.65	807.47	2.87	341.	6227.	15.08	16.08	0.00
.80	807.74	3.14	350.	7741.	15.67	16.00	0.00
1.00	808.05	3.45	361.	9794.	16.17	16.00	0.00

PLATE D-22

```
A1      MISSOURI DAM SAFETY INSPECTIONS
A2      LAKE CHATEAU DAM MO 10015
A3      10-YEAR FLOOD
B 00028800000000000000005                                          00000003
B1000003
K       C0000001                00000002        00000001
K1      CALCULATION OF 10-YR. FLOOD HYDROGRAPH
M       0000000200001.26                000001.0
O 000288
0100.0050000.0050000.0050000.0050000.0050000.0050000.0050000.0050000.0050000.005
0100.0050000.0050000.0050000.0050000.0050000.0050000.0050000.0050000.0050000.005
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0100.0290000.0290000.0150000.0150000.0150000.0150000.0150000.0150000.0150000.015
0100.0150000.0150000.0150000.0150000.0150000.0150000.0150000.0150000.0150000.015
0100.0110000.0110000.0110000.0110000.0110000.0110000.0110000.0110000.0110000.011
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0100.0050000.0050000.0050000.0050000.0050000.0050000.0050000.0050000.0050000.005
0100.0050000.0050000.0050000.0050000.0050000.0050000.0050000.005
T                                                          -1.     -82.
W2      00000.41
X 00000.    -.010000001.
K 0000010000002                 00000002        00000001
K1      RESERVOIR ROUTING OF 10-YR. FLOOD
Y                       00000001
Y1000001                                                -802.2      -1
Y40802.2000802.50000803.000803.5000803.80000804.0000805.0000806.0000807.0000808.
Y400809.0000810.
Y5C000C.C000010.0000042,0000087.0000121.0000122.C000124.0000280.0000750.0001560.
Y50263C.0004040.
$A00000.0000025.0000037.0000083.0000139.
$E00780.0000802.0000810.0000820.0000830.
$$0802.2
$D0804.6000003.0000001.50001125.
$I 00110.0000285.0000400.0000780.0000960.0001100.0001125.
$V0804.6000805.1000806.7000807.2000807.5000807.80000810.
K 000099
A
A
A
A
A
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PLATE D-23

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*********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
*********************************

RUN  DATE= 79/11/15.
     TIME= 15.00.47.

                         MISSOURI DAM SAFETY INSPECTIONS
                         LAKE CHATEAU DAM MO 10015
                         10-YEAR FLOOD

                                         JOB SPECIFICATION
               NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
              288        0        5        0        0        0        0        0        3        0
                                       JOPER      NWT    LROPT    TRACE
                                           3        0        0        0

          **********         **********         **********         **********         **********

                                      SUB-AREA RUNOFF COMPUTATION

                        CALCULATION OF 10-YR. FLOOD HYDROGRAPH

                              ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                             000001        0        0        0        2        0        1        0        0

                                          HYDROGRAPH DATA
               IHYDG     IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO    ISNOW    ISAME    LOCAL
                   0        2     1.26     0.00     1.26     1.00    0.000        0        0        0

                                            PRECIP DATA
                                  NP    STORM      DAJ      DAK
                                 288     0.00     0.00     0.00
                                          PRECIP PATTERN
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .02      .02
           .02      .02      .02      .02      .02      .02      .02      .02      .02      .02
           .02      .02      .02      .02      .02      .02      .03      .03      .03      .03
           .03      .03      .06      .06      .06      .06      .06      .06      .08      .08
           .08      .15      .15      .37      .59      .26      .15      .08      .08      .08
           .06      .06      .06      .06      .06      .06      .03      .03      .03      .03
           .03      .03      .02      .02      .02      .02      .02      .02      .02      .02
           .02      .02      .02      .02      .02      .02      .02      .02      .02      .02
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
           .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
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PLATE D-24

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01		

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-82.00	0.00	0.00

CURVE NO = -82.00 WETNESS = -1.00 EFFECT CN = 82.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= .41

RECESSION DATA

STRTQ= 0.00 QRCSN= -.01 RTIOR= 1.00

UNIT HYDROGRAPH 27 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .41 VOL= 1.00

120.	367.	770.	1160.	1336.	1327.	1166.	948.	673.	489.
363.	273.	199.	149.	110.	81.	60.	45.	33.	25.
18.	14.	11.	8.	5.	3.	0.			

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	0.00	.01	0.	1.01	12.05	145	.59	.45	.14	615.
1.01	.10	2	.01	0.00	.01	0.	1.01	12.10	146	.26	.21	.05	867.
1.01	.15	3	.01	0.00	.01	0.	1.01	12.15	147	.15	.12	.03	1184.
1.01	.20	4	.01	0.00	.01	0.	1.01	12.20	148	.08	.07	.01	1466.
1.01	.25	5	.01	0.00	.01	0.	1.01	12.25	149	.08	.07	.01	1622.
1.01	.30	6	.01	0.00	.01	0.	1.01	12.30	150	.08	.07	.01	1637.
1.01	.35	7	.01	0.00	.01	0.	1.01	12.35	151	.06	.05	.01	1537.
1.01	.40	8	.01	0.00	.01	0.	1.01	12.40	152	.06	.05	.01	1370.
1.01	.45	9	.01	0.00	.01	0.	1.01	12.45	153	.06	.05	.01	1177.
1.01	.50	10	.01	0.00	.01	0.	1.01	12.50	154	.06	.05	.01	1013.
1.01	.55	11	.01	0.00	.01	0.	1.01	12.55	155	.06	.05	.01	885.
1.01	1.00	12	.01	0.00	.01	0.	1.01	13.00	156	.06	.05	.01	788.
1.01	1.05	13	.01	0.00	.01	0.	1.01	13.05	157	.03	.02	.00	710.
1.01	1.10	14	.01	0.00	.01	0.	1.01	13.10	158	.03	.02	.00	644.
1.01	1.15	15	.01	0.00	.01	0.	1.01	13.15	159	.03	.02	.00	582.
1.01	1.20	16	.01	0.00	.01	0.	1.01	13.20	160	.03	.03	.00	521.
1.01	1.25	17	.01	0.00	.01	0.	1.01	13.25	161	.03	.03	.00	464.
1.01	1.30	18	.01	0.00	.01	0.	1.01	13.30	162	.03	.03	.00	413.
1.01	1.35	19	.01	0.00	.01	0.	1.01	13.35	163	.02	.01	.00	369.
1.01	1.40	20	.01	0.00	.01	0.	1.01	13.40	164	.02	.01	.00	331.
1.01	1.45	21	.01	0.00	.01	0.	1.01	13.45	165	.02	.01	.00	297.
1.01	1.50	22	.01	0.00	.01	0.	1.01	13.50	166	.02	.01	.00	266.
1.01	1.55	23	.01	0.00	.01	0.	1.01	13.55	167	.02	.01	.00	237.
1.01	2.00	24	.01	0.00	.01	0.	1.01	14.00	168	.02	.01	.00	211.
1.01	2.05	25	.01	0.00	.01	0.	1.01	14.05	169	.02	.01	.00	189.
1.01	2.10	26	.01	0.00	.01	0.	1.01	14.10	170	.02	.01	.00	171.
1.01	2.15	27	.01	0.00	.01	0.	1.01	14.15	171	.02	.01	.00	159.
1.01	2.20	28	.01	0.00	.01	0.	1.01	14.20	172	.02	.01	.00	150.
1.01	2.25	29	.01	0.00	.01	0.	1.01	14.25	173	.02	.01	.00	144.
1.01	2.30	30	.01	0.00	.01	0.	1.01	14.30	174	.02	.01	.00	139.
1.01	2.35	31	.01	0.00	.01	0.	1.01	14.35	175	.02	.01	.00	136.
1.01	2.40	32	.01	0.00	.01	0.	1.01	14.40	176	.02	.01	.00	134.
1.01	2.45	33	.01	0.00	.01	0.	1.01	14.45	177	.02	.01	.00	132.
1.01	2.50	34	.01	0.00	.01	0.	1.01	14.50	178	.02	.01	.00	131.

1.01	2.55	35	.01	0.00	.01	0.	1.01	14.55	179	.02	.01	.00	130.
1.01	3.00	36	.01	0.00	.01	0.	1.01	15.00	180	.02	.01	.00	129.
1.01	3.05	37	.01	0.00	.01	0.	1.01	15.05	181	.01	.01	.00	128.
1.01	3.10	38	.01	0.00	.01	0.	1.01	15.10	182	.01	.01	.00	127.
1.01	3.15	39	.01	0.00	.01	0.	1.01	15.15	183	.01	.01	.00	124.
1.01	3.20	40	.01	0.00	.01	0.	1.01	15.20	184	.01	.01	.00	120.
1.01	3.25	41	.01	0.00	.01	0.	1.01	15.25	185	.01	.01	.00	115.
1.01	3.30	42	.01	0.00	.01	0.	1.01	15.30	186	.01	.01	.00	110.
1.01	3.35	43	.01	0.00	.01	0.	1.01	15.35	187	.01	.01	.00	106.
1.01	3.40	44	.01	0.00	.01	0.	1.01	15.40	188	.01	.01	.00	103.
1.01	3.45	45	.01	0.00	.01	0.	1.01	15.45	189	.01	.01	.00	101.
1.01	3.50	46	.01	0.00	.01	0.	1.01	15.50	190	.01	.01	.00	99.
1.01	3.55	47	.01	0.00	.01	0.	1.01	15.55	191	.01	.01	.00	98.
1.01	4.00	48	.01	0.00	.01	0.	1.01	16.00	192	.01	.01	.00	97.
1.01	4.05	49	.01	0.00	.01	0.	1.01	16.05	193	.01	.01	.00	96.
1.01	4.10	50	.01	0.00	.01	0.	1.01	16.10	194	.01	.01	.00	96.
1.01	4.15	51	.01	0.00	.01	0.	1.01	16.15	195	.01	.01	.00	96.
1.01	4.20	52	.01	0.00	.01	0.	1.01	16.20	196	.01	.01	.00	95.
1.01	4.25	53	.01	0.00	.01	0.	1.01	16.25	197	.01	.01	.00	95.
1.01	4.30	54	.01	0.00	.01	0.	1.01	16.30	198	.01	.01	.00	95.
1.01	4.35	55	.01	0.00	.01	0.	1.01	16.35	199	.01	.01	.00	95.
1.01	4.40	56	.01	0.00	.01	0.	1.01	16.40	200	.01	.01	.00	95.
1.01	4.45	57	.01	0.00	.01	0.	1.01	16.45	201	.01	.01	.00	95.
1.01	4.50	58	.01	0.00	.01	0.	1.01	16.50	202	.01	.01	.00	95.
1.01	4.55	59	.01	0.00	.01	0.	1.01	16.55	203	.01	.01	.00	95.
1.01	5.00	60	.01	0.00	.01	0.	1.01	17.00	204	.01	.01	.00	95.
1.01	5.05	61	.01	0.00	.01	0.	1.01	17.05	205	.01	.01	.00	95.
1.01	5.10	62	.01	0.00	.01	0.	1.01	17.10	206	.01	.01	.00	95.
1.01	5.15	63	.01	0.00	.01	0.	1.01	17.15	207	.01	.01	.00	95.
1.01	5.20	64	.01	0.00	.01	0.	1.01	17.20	208	.01	.01	.00	95.
1.01	5.25	65	.01	0.00	.01	0.	1.01	17.25	209	.01	.01	.00	95.
1.01	5.30	66	.01	0.00	.01	0.	1.01	17.30	210	.01	.01	.00	95.
1.01	5.35	67	.01	0.00	.01	0.	1.01	17.35	211	.01	.01	.00	95.
1.01	5.40	68	.01	0.00	.01	0.	1.01	17.40	212	.01	.01	.00	95.
1.01	5.45	69	.01	0.00	.01	0.	1.01	17.45	213	.01	.01	.00	95.
1.01	5.50	70	.01	0.00	.01	0.	1.01	17.50	214	.01	.01	.00	95.
1.01	5.55	71	.01	0.00	.01	0.	1.01	17.55	215	.01	.01	.00	95.
1.01	6.00	72	.01	0.00	.01	0.	1.01	18.00	216	.01	.01	.00	95.
1.01	6.05	73	.01	0.00	.01	0.	1.01	18.05	217	.01	.00	.00	95.
1.01	6.10	74	.01	0.00	.01	0.	1.01	18.10	218	.01	.00	.00	93.
1.01	6.15	75	.01	0.00	.01	0.	1.01	18.15	219	.01	.00	.00	89.
1.01	6.20	76	.01	0.00	.01	0.	1.01	18.20	220	.01	.00	.00	83.
1.01	6.25	77	.01	0.00	.01	0.	1.01	18.25	221	.01	.00	.00	75.
1.01	6.30	78	.01	0.00	.01	0.	1.01	18.30	222	.01	.00	.00	68.
1.01	6.35	79	.01	0.00	.01	0.	1.01	18.35	223	.01	.00	.00	62.
1.01	6.40	80	.01	.00	.01	0.	1.01	18.40	224	.01	.00	.00	57.
1.01	6.45	81	.01	.00	.01	0.	1.01	18.45	225	.01	.00	.00	54.
1.01	6.50	82	.01	.00	.01	0.	1.01	18.50	226	.01	.00	.00	51.
1.01	6.55	83	.01	.00	.01	0.	1.01	18.55	227	.01	.00	.00	49.
1.01	7.00	84	.01	.00	.01	1.	1.01	19.00	228	.01	.00	.00	48.
1.01	7.05	85	.01	.00	.01	1.	1.01	19.05	229	.01	.00	.00	47.
1.01	7.10	86	.01	.00	.01	2.	1.01	19.10	230	.01	.00	.00	46.
1.01	7.15	87	.01	.00	.01	2.	1.01	19.15	231	.01	.00	.00	45.
1.01	7.20	88	.01	.00	.01	3.	1.01	19.20	232	.01	.00	.00	45.
1.01	7.25	89	.01	.00	.01	4.	1.01	19.25	233	.01	.00	.00	44.
1.01	7.30	90	.01	.00	.01	5.	1.01	19.30	234	.01	.00	.00	44.
1.01	7.35	91	.01	.00	.01	6.	1.01	19.35	235	.01	.00	.00	44.
1.01	7.40	92	.01	.00	.01	7.	1.01	19.40	236	.01	.00	.00	44.
1.01	7.45	93	.01	.00	.01	8.	1.01	19.45	237	.01	.00	.00	44.
1.01	7.50	94	.01	.00	.01	8.	1.01	19.50	238	.01	.00	.00	44.
1.01	7.55	95	.01	.00	.01	9.	1.01	19.55	239	.01	.00	.00	44.
1.01	8.00	96	.01	.00	.01	10.	1.01	20.00	240	.01	.00	.00	44.

PLATE D-26

1.01	8.05	97	.01	.00	.01	11.	1.01	20.05	241	.01	.00	.00	44.
1.01	8.10	98	.01	.00	.01	12.	1.01	20.10	242	.01	.00	.00	44.
1.01	8.15	99	.01	.00	.01	13.	1.01	20.15	243	.01	.00	.00	44.
1.01	8.20	100	.01	.00	.01	14.	1.01	20.20	244	.01	.00	.00	44.
1.01	8.25	101	.01	.00	.01	15.	1.01	20.25	245	.01	.00	.00	44.
1.01	8.30	102	.01	.00	.01	16.	1.01	20.30	246	.01	.00	.00	44.
1.01	8.35	103	.01	.00	.01	16.	1.01	20.35	247	.01	.00	.00	44.
1.01	8.40	104	.01	.00	.01	17.	1.01	20.40	248	.01	.00	.00	44.
1.01	8.45	105	.01	.00	.01	18.	1.01	20.45	249	.01	.00	.00	44.
1.01	8.50	106	.01	.00	.01	19.	1.01	20.50	250	.01	.00	.00	44.
1.01	8.55	107	.01	.00	.01	20.	1.01	20.55	251	.01	.00	.00	44.
1.01	9.00	108	.01	.00	.01	20.	1.01	21.00	252	.01	.00	.00	44.
1.01	9.05	109	.02	.00	.01	21.	1.01	21.05	253	.01	.00	.00	44.
1.01	9.10	110	.02	.00	.01	22.	1.01	21.10	254	.01	.00	.00	44.
1.01	9.15	111	.02	.00	.01	24.	1.01	21.15	255	.01	.00	.00	44.
1.01	9.20	112	.02	.00	.01	26.	1.01	21.20	256	.01	.00	.00	44.
1.01	9.25	113	.02	.00	.01	28.	1.01	21.25	257	.01	.00	.00	44.
1.01	9.30	114	.02	.00	.01	30.	1.01	21.30	258	.01	.00	.00	44.
1.01	9.35	115	.02	.00	.01	33.	1.01	21.35	259	.01	.00	.00	44.
1.01	9.40	116	.02	.00	.01	35.	1.01	21.40	260	.01	.00	.00	44.
1.01	9.45	117	.02	.00	.01	36.	1.01	21.45	261	.01	.00	.00	44.
1.01	9.50	118	.02	.00	.01	38.	1.01	21.50	262	.01	.00	.00	44.
1.01	9.55	119	.02	.00	.01	39.	1.01	21.55	263	.01	.00	.00	44.
1.01	10.00	120	.02	.00	.01	41.	1.01	22.00	264	.01	.00	.00	44.
1.01	10.05	121	.02	.01	.01	42.	1.01	22.05	265	.01	.00	.00	44.
1.01	10.10	122	.02	.01	.01	44.	1.01	22.10	266	.01	.00	.00	44.
1.01	10.15	123	.02	.01	.01	45.	1.01	22.15	267	.01	.00	.00	44.
1.01	10.20	124	.02	.01	.01	46.	1.01	22.20	268	.01	.00	.00	44.
1.01	10.25	125	.02	.01	.01	47.	1.01	22.25	269	.01	.00	.00	44.
1.01	10.30	126	.02	.01	.01	48.	1.01	22.30	270	.01	.00	.00	44.
1.01	10.35	127	.03	.01	.02	50.	1.01	22.35	271	.01	.00	.00	44.
1.01	10.40	128	.03	.01	.02	53.	1.01	22.40	272	.01	.00	.00	44.
1.01	10.45	129	.03	.01	.02	58.	1.01	22.45	273	.01	.00	.00	44.
1.01	10.50	130	.03	.01	.02	66.	1.01	22.50	274	.01	.00	.00	44.
1.01	10.55	131	.03	.01	.02	75.	1.01	22.55	275	.01	.00	.00	44.
1.01	11.00	132	.03	.01	.02	84.	1.01	23.00	276	.01	.00	.00	44.
1.01	11.05	133	.06	.03	.03	95.	1.01	23.05	277	.01	.00	.00	44.
1.01	11.10	134	.06	.03	.03	107.	1.01	23.10	278	.01	.00	.00	44.
1.01	11.15	135	.06	.03	.03	125.	1.01	23.15	279	.01	.00	.00	44.
1.01	11.20	136	.06	.03	.03	148.	1.01	23.20	280	.01	.00	.00	44.
1.01	11.25	137	.06	.03	.03	174.	1.01	23.25	281	.01	.00	.00	44.
1.01	11.30	138	.06	.03	.03	201.	1.01	23.30	282	.01	.00	.00	44.
1.01	11.35	139	.08	.05	.03	228.	1.01	23.35	283	.01	.00	.00	44.
1.01	11.40	140	.08	.05	.03	254.	1.01	23.40	284	.01	.00	.00	44.
1.01	11.45	141	.08	.05	.03	282.	1.01	23.45	285	.01	.00	.00	44.
1.01	11.50	142	.15	.10	.05	318.	1.01	23.50	286	.01	.00	.00	44.
1.01	11.55	143	.15	.10	.05	365.	1.01	23.55	287	.01	.00	.00	44.
1.01	12.00	144	.37	.26	.11	451.	1.02	0.00	288	.01	.00	.00	44.
									SUM	5.26	3.31	1.95	32067.
										(134.1(	84.1(	49.1(| 908.04)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1637.	363.	111.	111.	32038.
CMS	46.	10.	3.	3.	907.
INCHES		2.68	3.29	3.29	3.29
MM		68.16	83.44	83.44	83.44
AC-FT		180.	221.	221.	221.
THOUS CU M		222.	272.	272.	272.

OVN

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

RESERVOIR ROUTING OF 10-YR. FLOOD

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
000002	1	0	0	2	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-802.	-1

STAGE	802.20	802.50	803.00	803.50	803.80	804.00	805.00	806.00	807.00	808.00
	809.00	810.00								
FLOW	0.00	10.00	42.00	87.00	121.00	122.00	124.00	280.00	750.00	1560.00
	2630.00	4040.00								
SURFACE AREA=	0.	25.	37.	83.	139.					
CAPACITY=	0.	183.	430.	1014.	2113.					
ELEVATION=	780.	802.	810.	820.	830.					

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
802.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
804.6	3.0	1.5	1125.

CREST LENGTH	110.	285.	400.	780.	960.	1100.	1125.
AT OR BELOW ELEVATION	804.6	805.1	806.7	807.2	807.5	807.8	810.0

END-OF-PERIOD HYDROGRAPH ORDINATES

MO.DA	HR.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	.05	1	.08	0.	0.	188.	802.2
1.01	.10	2	.17	0.	0.	188.	802.2
1.01	.15	3	.25	0.	0.	188.	802.2
1.01	.20	4	.33	0.	0.	188.	802.2
1.01	.25	5	.42	0.	0.	188.	802.2
1.01	.30	6	.50	0.	0.	188.	802.2
1.01	.35	7	.58	0.	0.	188.	802.2
1.01	.40	8	.67	0.	0.	188.	802.2
1.01	.45	9	.75	0.	0.	188.	802.2
1.01	.50	10	.83	0.	0.	188.	802.2
1.01	.55	11	.92	0.	0.	188.	802.2
1.01	1.00	12	1.00	0.	0.	188.	802.2
1.01	1.05	13	1.08	0.	0.	188.	802.2
1.01	1.10	14	1.17	0.	0.	188.	802.2
1.01	1.15	15	1.25	0.	0.	188.	802.2
1.01	1.20	16	1.33	0.	0.	188.	802.2
1.01	1.25	17	1.42	0.	0.	188.	802.2

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1.01	1.30	18	1.50	0.	0.	188.	802.2
1.01	1.35	19	1.58	0.	0.	188.	802.2
1.01	1.40	20	1.67	0.	0.	188.	802.2
1.01	1.45	21	1.75	0.	0.	188.	802.2
1.01	1.50	22	1.83	0.	0.	188.	802.2
1.01	1.55	23	1.92	0.	0.	188.	802.2
1.01	2.00	24	2.00	0.	0.	188.	802.2
1.01	2.05	25	2.08	0.	0.	188.	802.2
1.01	2.10	26	2.17	0.	0.	188.	802.2
1.01	2.15	27	2.25	0.	0.	188.	802.2
1.01	2.20	28	2.33	0.	0.	188.	802.2
1.01	2.25	29	2.42	0.	0.	188.	802.2
1.01	2.30	30	2.50	0.	0.	188.	802.2
1.01	2.35	31	2.58	0.	0.	188.	802.2
1.01	2.40	32	2.67	0.	0.	188.	802.2
1.01	2.45	33	2.75	0.	0.	188.	802.2
1.01	2.50	34	2.83	0.	0.	188.	802.2
1.01	2.55	35	2.92	0.	0.	188.	802.2
1.01	3.00	36	3.00	0.	0.	188.	802.2
1.01	3.05	37	3.08	0.	0.	188.	802.2
1.01	3.10	38	3.17	0.	0.	188.	802.2
1.01	3.15	39	3.25	0.	0.	188.	802.2
1.01	3.20	40	3.33	0.	0.	188.	802.2
1.01	3.25	41	3.42	0.	0.	188.	802.2
1.01	3.30	42	3.50	0.	0.	188.	802.2
1.01	3.35	43	3.58	0.	0.	188.	802.2
1.01	3.40	44	3.67	0.	0.	188.	802.2
1.01	3.45	45	3.75	0.	0.	188.	802.2
1.01	3.50	46	3.83	0.	0.	188.	802.2
1.01	3.55	47	3.92	0.	0.	188.	802.2
1.01	4.00	48	4.00	0.	0.	188.	802.2
1.01	4.05	49	4.08	0.	0.	188.	802.2
1.01	4.10	50	4.17	0.	0.	188.	802.2
1.01	4.15	51	4.25	0.	0.	188.	802.2
1.01	4.20	52	4.33	0.	0.	188.	802.2
1.01	4.25	53	4.42	0.	0.	188.	802.2
1.01	4.30	54	4.50	0.	0.	188.	802.2
1.01	4.35	55	4.58	0.	0.	188.	802.2
1.01	4.40	56	4.67	0.	0.	188.	802.2
1.01	4.45	57	4.75	0.	0.	188.	802.2
1.01	4.50	58	4.83	0.	0.	188.	802.2
1.01	4.55	59	4.92	0.	0.	188.	802.2
1.01	5.00	60	5.00	0.	0.	188.	802.2
1.01	5.05	61	5.08	0.	0.	188.	802.2
1.01	5.10	62	5.17	0.	0.	188.	802.2
1.01	5.15	63	5.25	0.	0.	188.	802.2
1.01	5.20	64	5.33	0.	0.	188.	802.2
1.01	5.25	65	5.42	0.	0.	188.	802.2
1.01	5.30	66	5.50	0.	0.	188.	802.2
1.01	5.35	67	5.58	0.	0.	188.	802.2
1.01	5.40	68	5.67	0.	0.	188.	802.2
1.01	5.45	69	5.75	0.	0.	188.	802.2
1.01	5.50	70	5.83	0.	0.	188.	802.2
1.01	5.55	71	5.92	0.	0.	188.	802.2
1.01	6.00	72	6.00	0.	0.	188.	802.2
1.01	6.05	73	6.08	0.	0.	188.	802.2
1.01	6.10	74	6.17	0.	0.	188.	802.2
1.01	6.15	75	6.25	0.	0.	188.	802.2
1.01	6.20	76	6.33	0.	0.	188.	802.2
1.01	6.25	77	6.42	0.	0.	188.	802.2
1.01	6.30	78	6.50	0.	0.	188.	802.2
1.01	6.35	79	6.58	0.	0.	188.	802.2

1.01	6.40	80	6.67	0.	0.	188.	802.2
1.01	6.45	81	6.75	0.	0.	188.	802.2
1.01	6.50	82	6.83	0.	0.	188.	802.2
1.01	6.55	83	6.92	0.	0.	188.	802.2
1.01	7.00	84	7.00	1.	0.	188.	802.2
1.01	7.05	85	7.08	1.	0.	188.	802.2
1.01	7.10	86	7.17	2.	0.	188.	802.2
1.01	7.15	87	7.25	2.	0.	188.	802.2
1.01	7.20	88	7.33	3.	0.	188.	802.2
1.01	7.25	89	7.42	4.	0.	188.	802.2
1.01	7.30	90	7.50	5.	0.	188.	802.2
1.01	7.35	91	7.58	6.	0.	188.	802.2
1.01	7.40	92	7.67	7.	0.	189.	802.2
1.01	7.45	93	7.75	8.	0.	189.	802.2
1.01	7.50	94	7.83	8.	0.	189.	802.2
1.01	7.55	95	7.92	9.	0.	189.	802.2
1.01	8.00	96	8.00	10.	1.	189.	802.2
1.01	8.05	97	8.08	11.	1.	189.	802.2
1.01	8.10	98	8.17	12.	1.	189.	802.2
1.01	8.15	99	8.25	13.	1.	189.	802.2
1.01	8.20	100	8.33	14.	1.	189.	802.2
1.01	8.25	101	8.42	15.	1.	189.	802.2
1.01	8.30	102	8.50	16.	1.	189.	802.2
1.01	8.35	103	8.58	16.	1.	189.	802.2
1.01	8.40	104	8.67	17.	1.	189.	802.2
1.01	8.45	105	8.75	18.	2.	190.	802.2
1.01	8.50	106	8.83	19.	2.	190.	802.3
1.01	8.55	107	8.92	20.	2.	190.	802.3
1.01	9.00	108	9.00	20.	2.	190.	802.3
1.01	9.05	109	9.08	21.	2.	190.	802.3
1.01	9.10	110	9.17	22.	2.	190.	802.3
1.01	9.15	111	9.25	24.	3.	190.	802.3
1.01	9.20	112	9.33	26.	3.	190.	802.3
1.01	9.25	113	9.42	28.	3.	191.	802.3
1.01	9.30	114	9.50	30.	3.	191.	802.3
1.01	9.35	115	9.58	33.	4.	191.	802.3
1.01	9.40	116	9.67	35.	4.	191.	802.3
1.01	9.45	117	9.75	36.	4.	191.	802.3
1.01	9.50	118	9.83	38.	4.	192.	802.3
1.01	9.55	119	9.92	39.	5.	192.	802.3
1.01	10.00	120	10.00	41.	5.	192.	802.3
1.01	10.05	121	10.08	42.	5.	192.	802.4
1.01	10.10	122	10.17	44.	6.	193.	802.4
1.01	10.15	123	10.25	45.	6.	193.	802.4
1.01	10.20	124	10.33	46.	6.	193.	802.4
1.01	10.25	125	10.42	47.	7.	193.	802.4
1.01	10.30	126	10.50	48.	7.	194.	802.4
1.01	10.35	127	10.58	50.	7.	194.	802.4
1.01	10.40	128	10.67	53.	8.	194.	802.4
1.01	10.45	129	10.75	58.	8.	195.	802.4
1.01	10.50	130	10.83	66.	9.	195.	802.5
1.01	10.55	131	10.92	75.	9.	195.	802.5
1.01	11.00	132	11.00	84.	10.	196.	802.5
1.01	11.05	133	11.08	94.	11.	196.	802.5
1.01	11.10	134	11.17	107.	13.	197.	802.5
1.01	11.15	135	11.25	125.	15.	198.	802.6
1.01	11.20	136	11.33	148.	17.	199.	802.6
1.01	11.25	137	11.42	174.	19.	200.	802.6
1.01	11.30	138	11.50	201.	22.	201.	802.7
1.01	11.35	139	11.58	228.	25.	202.	802.7
1.01	11.40	140	11.67	254.	29.	204.	802.8
1.01	11.45	141	11.75	282.	33.	205.	802.9

PLATE D-30

1.01	11.50	142	11.83	318.	37.	207.	802.9
1.01	11.55	143	11.92	365.	42.	209.	803.0
1.01	12.00	144	12.00	451.	51.	212.	803.1
1.01	12.05	145	12.08	615.	62.	215.	803.2
1.01	12.10	146	12.17	867.	77.	219.	803.4
1.01	12.15	147	12.25	1184.	102.	226.	803.6
1.01	12.20	148	12.33	1466.	122.	234.	803.9
1.01	12.25	149	12.42	1622.	123.	244.	804.3
1.01	12.30	150	12.50	1637.	127.	254.	804.7
1.01	12.35	151	12.58	1537.	241.	264.	805.0
1.01	12.40	152	12.67	1370.	469.	272.	805.2
1.01	12.45	153	12.75	1177.	661.	277.	805.4
1.01	12.50	154	12.83	1013.	773.	279.	805.5
1.01	12.55	155	12.92	885.	820.	280.	805.5
1.01	13.00	156	13.00	788.	825.	280.	805.5
1.01	13.05	157	13.08	710.	804.	280.	805.5
1.01	13.10	158	13.17	644.	770.	279.	805.5
1.01	13.15	159	13.25	582.	729.	278.	805.5
1.01	13.20	160	13.33	521.	684.	277.	805.4
1.01	13.25	161	13.42	464.	636.	276.	805.4
1.01	13.30	162	13.50	413.	587.	275.	805.3
1.01	13.35	163	13.58	369.	541.	274.	805.3
1.01	13.40	164	13.67	331.	497.	272.	805.3
1.01	13.45	165	13.75	297.	456.	271.	805.2
1.01	13.50	166	13.83	266.	418.	270.	805.2
1.01	13.55	167	13.92	237.	384.	269.	805.2
1.01	14.00	168	14.00	211.	353.	268.	805.1
1.01	14.05	169	14.08	189.	324.	267.	805.1
1.01	14.10	170	14.17	171.	299.	266.	805.1
1.01	14.15	171	14.25	159.	276.	266.	805.0
1.01	14.20	172	14.33	150.	256.	265.	805.0
1.01	14.25	173	14.42	144.	241.	264.	805.0
1.01	14.30	174	14.50	139.	229.	263.	805.0
1.01	14.35	175	14.58	136.	219.	263.	804.9
1.01	14.40	176	14.67	134.	210.	262.	804.9
1.01	14.45	177	14.75	132.	202.	262.	804.9
1.01	14.50	178	14.83	131.	195.	261.	804.9
1.01	14.55	179	14.92	130.	189.	261.	804.9
1.01	15.00	180	15.00	129.	184.	261.	804.9
1.01	15.05	181	15.08	128.	179.	260.	804.9
1.01	15.10	182	15.17	127.	174.	260.	804.8
1.01	15.15	183	15.25	124.	170.	260.	804.8
1.01	15.20	184	15.33	120.	167.	259.	804.8
1.01	15.25	185	15.42	115.	163.	259.	804.8
1.01	15.30	186	15.50	110.	159.	259.	804.8
1.01	15.35	187	15.58	106.	156.	258.	804.8
1.01	15.40	188	15.67	103.	152.	258.	804.8
1.01	15.45	189	15.75	101.	149.	258.	804.8
1.01	15.50	190	15.83	99.	146.	257.	804.7
1.01	15.55	191	15.92	98.	144.	257.	804.7
1.01	16.00	192	16.00	97.	141.	257.	804.7
1.01	16.05	193	16.08	96.	139.	256.	804.7
1.01	16.10	194	16.17	96.	137.	256.	804.7
1.01	16.15	195	16.25	96.	135.	256.	804.7
1.01	16.20	196	16.33	95.	133.	256.	804.7
1.01	16.25	197	16.42	95.	132.	255.	804.7
1.01	16.30	198	16.50	95.	130.	255.	804.7
1.01	16.35	199	16.58	95.	129.	255.	804.7
1.01	16.40	200	16.67	95.	128.	255.	804.7
1.01	16.45	201	16.75	95.	127.	254.	804.6
1.01	16.50	202	16.83	95.	126.	254.	804.6
1.01	16.55	203	16.92	95.	125.	254.	804.6

PLATE D-31

1.01	17.00	204	17.00	95.	125.	254.	804.6
1.01	17.05	205	17.08	95.	124.	254.	804.6
1.01	17.10	206	17.17	95.	124.	253.	804.6
1.01	17.15	207	17.25	95.	123.	253.	804.6
1.01	17.20	208	17.33	95.	123.	253.	804.6
1.01	17.25	209	17.42	95.	123.	253.	804.6
1.01	17.30	210	17.50	95.	123.	253.	804.6
1.01	17.35	211	17.58	95.	123.	252.	804.6
1.01	17.40	212	17.67	95.	123.	252.	804.6
1.01	17.45	213	17.75	95.	123.	252.	804.6
1.01	17.50	214	17.83	95.	123.	252.	804.6
1.01	17.55	215	17.92	95.	123.	252.	804.6
1.01	18.00	216	18.00	95.	123.	251.	804.5
1.01	18.05	217	18.08	95.	123.	251.	804.5
1.01	18.10	218	18.17	93.	123.	251.	804.5
1.01	18.15	219	18.25	89.	123.	251.	804.5
1.01	18.20	220	18.33	83.	123.	251.	804.5
1.01	18.25	221	18.42	75.	123.	250.	804.5
1.01	18.30	222	18.50	68.	123.	250.	804.5
1.01	18.35	223	18.58	62.	123.	250.	804.5
1.01	18.40	224	18.67	57.	123.	249.	804.5
1.01	18.45	225	18.75	54.	123.	249.	804.4
1.01	18.50	226	18.83	51.	123.	248.	804.4
1.01	18.55	227	18.92	49.	123.	248.	804.4
1.01	19.00	228	19.00	48.	123.	247.	804.4
1.01	19.05	229	19.08	47.	123.	247.	804.4
1.01	19.10	230	19.17	46.	123.	246.	804.4
1.01	19.15	231	19.25	45.	123.	246.	804.3
1.01	19.20	232	19.33	45.	123.	245.	804.3
1.01	19.25	233	19.42	44.	123.	244.	804.3
1.01	19.30	234	19.50	44.	123.	244.	804.3
1.01	19.35	235	19.58	44.	123.	243.	804.3
1.01	19.40	236	19.67	44.	122.	243.	804.2
1.01	19.45	237	19.75	44.	122.	242.	804.2
1.01	19.50	238	19.83	44.	122.	242.	804.2
1.01	19.55	239	19.92	44.	122.	241.	804.2
1.01	20.00	240	20.00	44.	122.	241.	804.2
1.01	20.05	241	20.08	44.	122.	240.	804.1
1.01	20.10	242	20.17	44.	122.	240.	804.1
1.01	20.15	243	20.25	44.	122.	239.	804.1
1.01	20.20	244	20.33	44.	122.	239.	804.1
1.01	20.25	245	20.42	44.	122.	238.	804.1
1.01	20.30	246	20.50	44.	122.	237.	804.0
1.01	20.35	247	20.58	44.	122.	237.	804.0
1.01	20.40	248	20.67	44.	122.	236.	804.0
1.01	20.45	249	20.75	44.	122.	236.	804.0
1.01	20.50	250	20.83	44.	122.	235.	804.0
1.01	20.55	251	20.92	44.	122.	235.	804.0
1.01	21.00	252	21.00	44.	122.	234.	803.9
1.01	21.05	253	21.08	44.	122.	234.	803.9
1.01	21.10	254	21.17	44.	121.	233.	803.9
1.01	21.15	255	21.25	44.	121.	233.	803.9
1.01	21.20	256	21.33	44.	121.	232.	803.9
1.01	21.25	257	21.42	44.	121.	232.	803.8
1.01	21.30	258	21.50	44.	121.	231.	803.8
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1.01	21.40	260	21.67	44.	119.	230.	803.8
1.01	21.45	261	21.75	44.	117.	229.	803.8
1.01	21.50	262	21.83	44.	114.	229.	803.7
1.01	21.55	263	21.92	44.	113.	229.	803.7
1.01	22.00	264	22.00	44.	111.	228.	803.7
1.01	22.05	265	22.08	44.	109.	228.	803.7

PLATE D-32

1.01	22.10	266	22.17	44.	107.	227.	803.7
1.01	22.15	267	22.25	44.	105.	227.	803.7
1.01	22.20	268	22.33	44.	103.	226.	803.6
1.01	22.25	269	22.42	44.	102.	226.	803.6
1.01	22.30	270	22.50	44.	100.	226.	803.6
1.01	22.35	271	22.58	44.	98.	225.	803.6
1.01	22.40	272	22.67	44.	97.	225.	803.6
1.01	22.45	273	22.75	44.	95.	224.	803.6
1.01	22.50	274	22.83	44.	94.	224.	803.6
1.01	22.55	275	22.92	44.	93.	224.	803.5
1.01	23.00	276	23.00	44.	91.	223.	803.5
1.01	23.05	277	23.08	44.	90.	223.	803.5
1.01	23.10	278	23.17	44.	89.	223.	803.5
1.01	23.15	279	23.25	44.	87.	222.	803.5
1.01	23.20	280	23.33	44.	86.	222.	803.5
1.01	23.25	281	23.42	44.	85.	222.	803.5
1.01	23.30	282	23.50	44.	84.	222.	803.5
1.01	23.35	283	23.58	44.	83.	221.	803.5
1.01	23.40	284	23.67	44.	83.	221.	803.5
1.01	23.45	285	23.75	44.	82.	221.	803.4
1.01	23.50	286	23.83	44.	81.	221.	803.4
1.01	23.55	287	23.92	44.	80.	220.	803.4
1.02	0.00	288	24.00	44.	79.	220.	803.4

PEAK OUTFLOW IS 825. AT TIME 13.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	825.	266.	95.	95.	27487.
CMS	23.	8.	3.	3.	778.
INCHES		1.96	2.82	2.82	2.82
MM		49.90	71.59	71.59	71.59
AC-FT		132.	189.	189.	189.
THOUS CU M		163.	234.	234.	234.

PLATE D-33

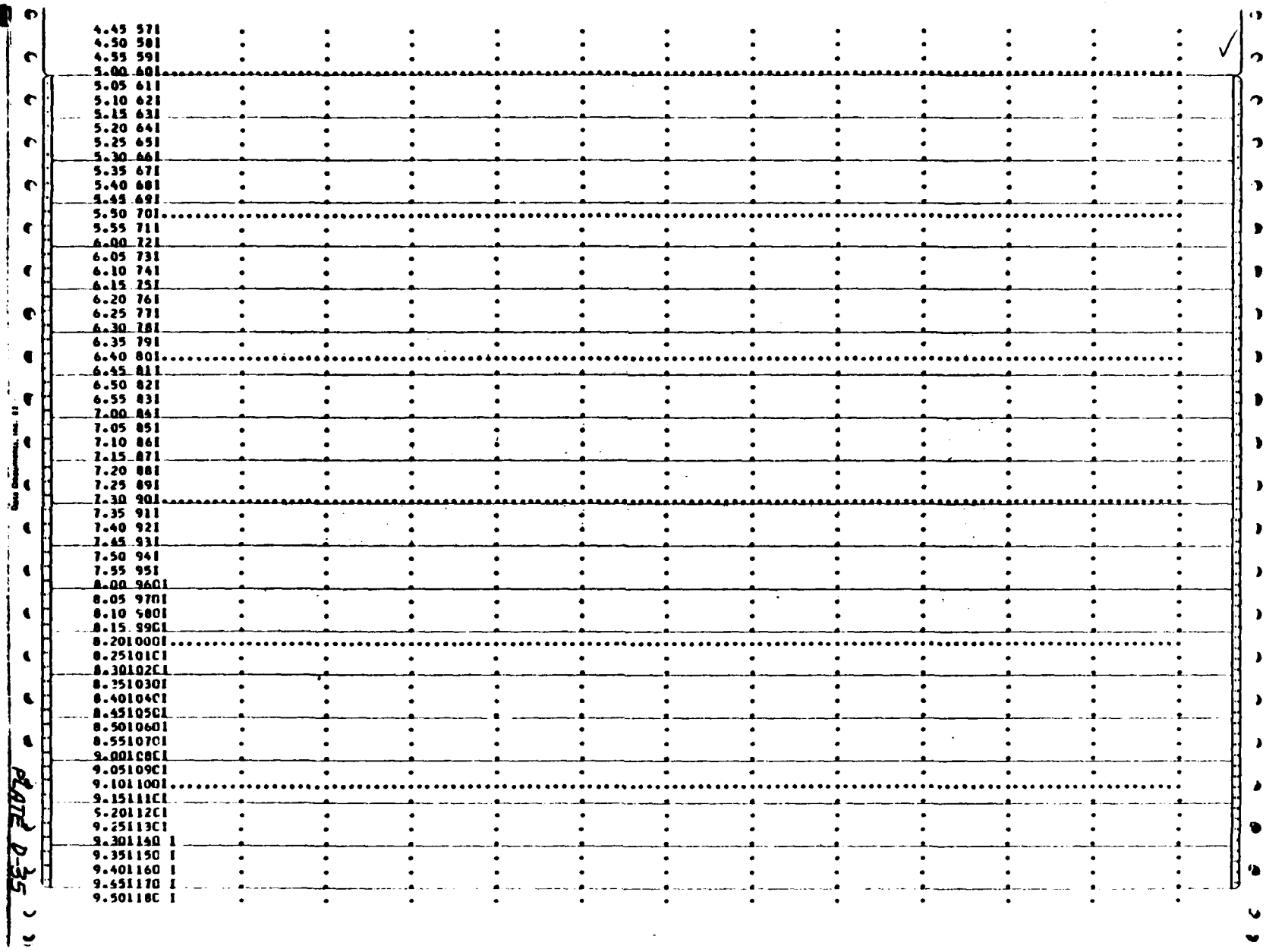
DVF

STATION000002

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	200.	400.	600.	800.	1000.	1200.	1400.	1600.	1800.	0.	0.	0.
.05	11												
.10	21												
.15	31												
.20	41												
.25	51												
.30	61												
.35	71												
.40	81												
.45	91												
.50	101												
.55	111												
1.00	121												
1.05	131												
1.10	141												
1.15	151												
1.20	161												
1.25	171												
1.30	181												
1.35	191												
1.40	201												
1.45	211												
1.50	221												
1.55	231												
2.00	241												
2.05	251												
2.10	261												
2.15	271												
2.20	281												
2.25	291												
2.30	301												
2.35	311												
2.40	321												
2.45	331												
2.50	341												
2.55	351												
3.00	361												
3.05	371												
3.10	381												
3.15	391												
3.20	401												
3.25	411												
3.30	421												
3.35	431												
3.40	441												
3.45	451												
3.50	461												
3.55	471												
4.00	481												
4.05	491												
4.10	501												
4.15	511												
4.20	521												
4.25	531												
4.30	541												
4.35	551												
4.40	561												

PLATE D-34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5.20 64I
5.25 65I
5.30 66I
5.35 67I
5.40 68I
5.45 69I
5.50 70I
5.55 71I
6.00 72I
6.05 73I
6.10 74I
6.15 75I
6.20 76I
6.25 77I
6.30 78I
6.35 79I
6.40 80I
6.45 81I
6.50 82I
6.55 83I
7.00 84I
7.05 85I
7.10 86I
7.15 87I
7.20 88I
7.25 89I
7.30 90I
7.35 91I
7.40 92I
7.45 93I
7.50 94I
7.55 95I
8.00 96OI
8.05 97OI
8.10 98OI
8.15 99OI
8.201000I
8.25101CI
8.30102CI
8.351030I
8.40104CI
8.45105CI
8.501060I
8.551070I
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9.05109CI
9.101100I
9.15111CI
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9.351150 I
9.401160 I
9.451170 I
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PLATE D-35

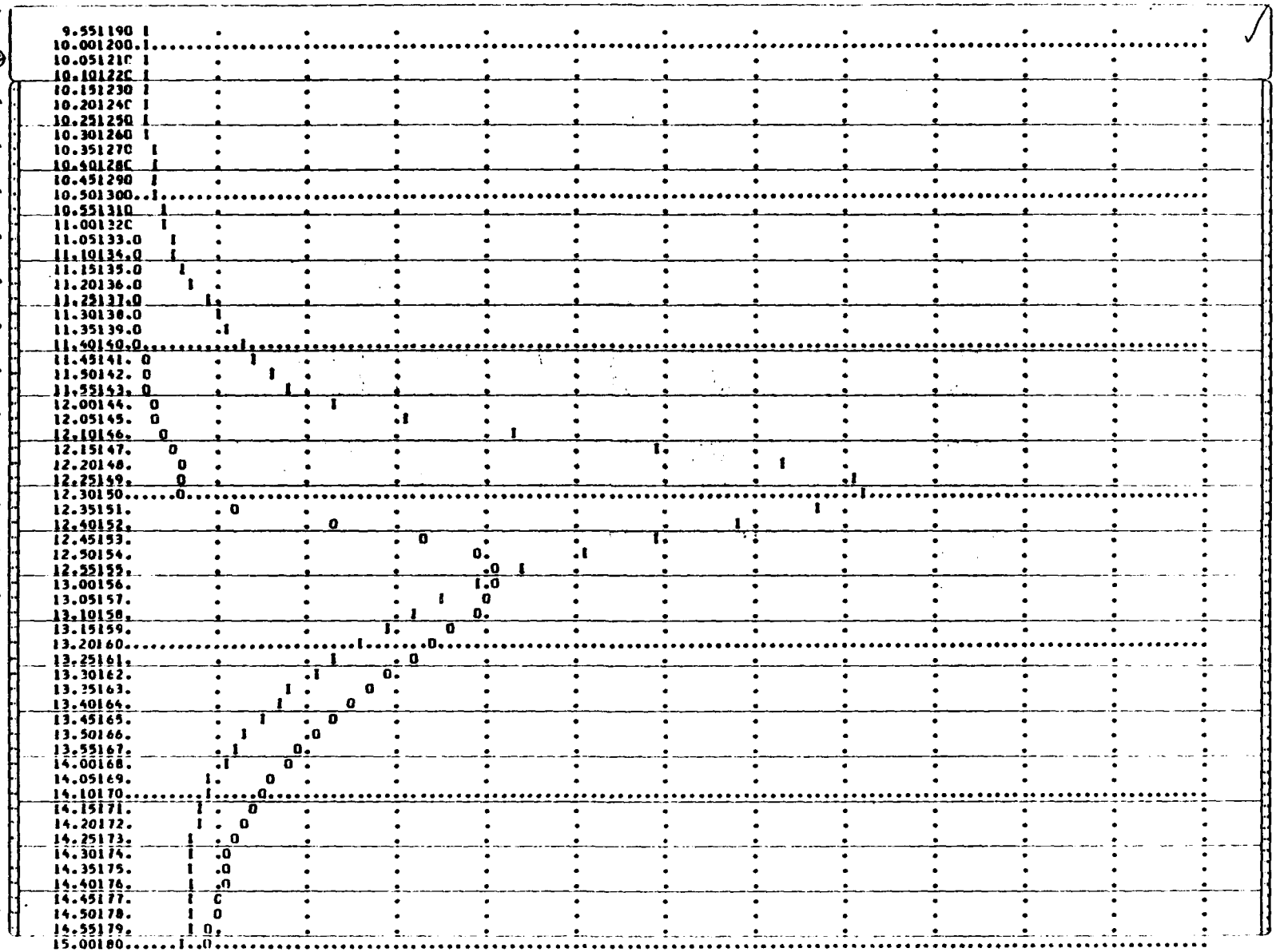
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PLATE D-36

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PLATE D-37

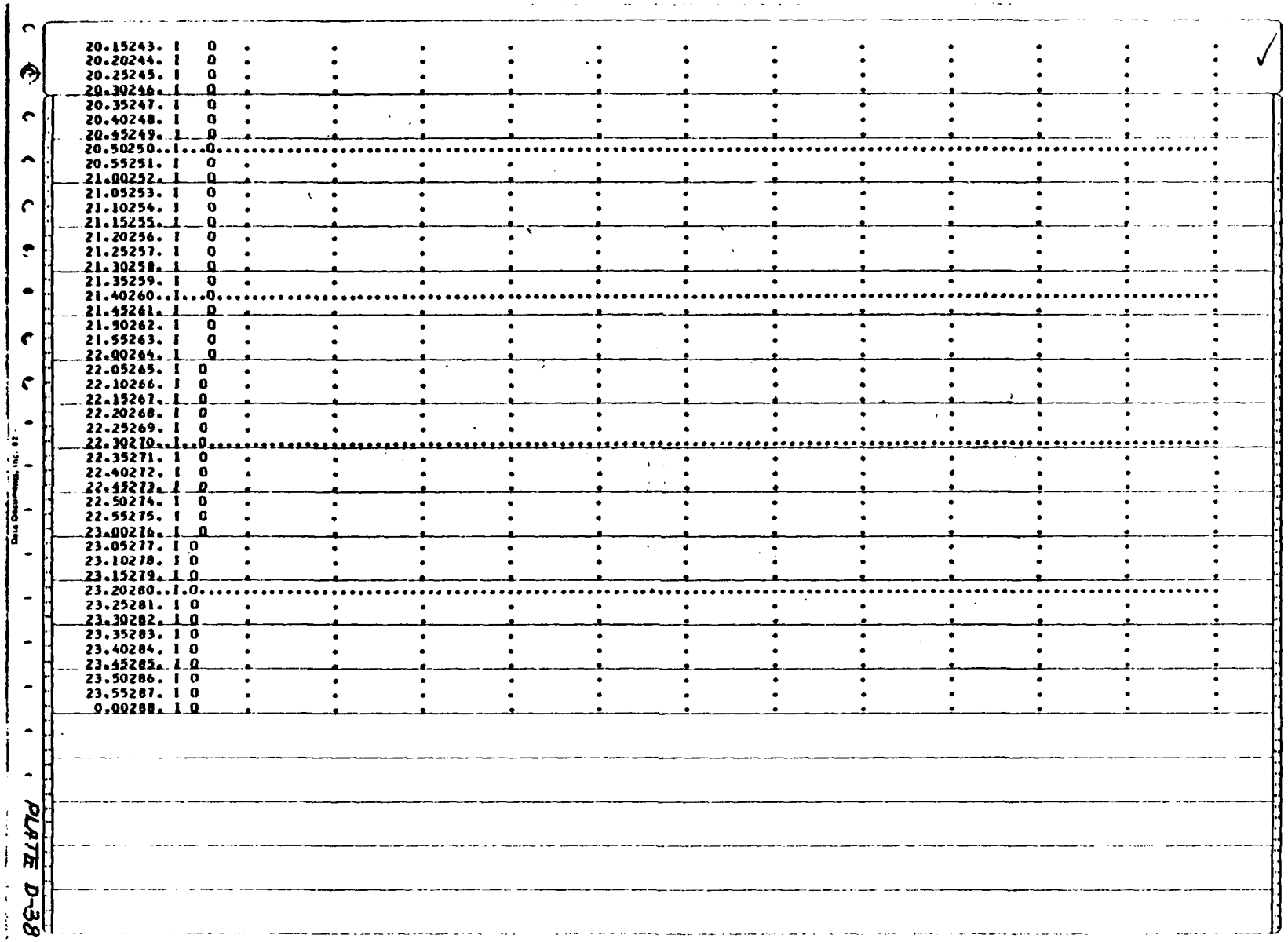
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PLATE D-38

RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES(SQUARE KILOMETERS)

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	000001	1637.	363.	111.	111.	1.26
	(	46.34)(	10.29)(	3.15)(	3.15)(	3.26)
ROUTED TO	000002	825.	266.	95.	95.	1.26
	(	23.36)(	7.54)(	2.70)(	2.70)(	3.26)

PLATE D-39

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	802.20	802.20	804.60
STORAGE	188.	188.	253.
OUTFLOW	0.	0.	123.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.00	805.53	.93	280.	825.	4.83	13.00	0.00

PLATE D-40